CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS

PROPOSED AMENDMENTS TO THE CALIFORNIA ZERO EMISSION VEHICLE PROGRAM REGULATIONS

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EXECUTIVE SUMMARY

In 1990, California embarked on an ambitious strategy to reduce vehicle emissions to zero. This objective was to be achieved through the gradual introduction of electric vehicles into the California fleet. Specifically, the Air Resources Board mandated that at least 2 percent, 5 percent and 10 percent of new car sales be zero-emitting by 1998, 2001 and 2003, respectively.

The Zero Emission Vehicle (ZEV) mandate for passenger cars has been adjusted twice since then, in 1996 and 1998. The underlying goal, however, has not changed. California remains committed to achieving zero emissions performance wherever feasible in the vehicle fleet. The challenge is determining how to achieve sustainable success in the field.

At its September 7 and 8, 2000 meeting, the Board considered the status of the ZEV program. After hearing extensive testimony and public comment, the Board adopted a resolution affirming that the ZEV program is an essential component of the State's long-term air quality strategy. The Board further resolved that the basic ZEV requirements be retained and implemented in California. Finally, the Board directed staff to develop and propose regulatory modifications and other steps that address the challenges associated with the successful long-term implementation of the ZEV program, and that result in a sustainable market for ZEVs. In particular, the Board identified the need for near-term product availability and market stability, the need to greatly enhance public education regarding the attributes and benefits of ZEV technologies, and the need to reduce or mitigate the high initial costs of vehicles and batteries in low-volume production.

Proposed Modifications to the Regulations

In response to the Board's directive, the staff has prepared a staff proposal that is designed to maintain progress towards commercialization of zero emission vehicles while recognizing near term constraints due to cost, lead time, and technical challenges. The proposal maintains a core ZEV component, but significantly reduces the total cost of the program. The staff proposal would make the following specific modifications:

Introduction of partial ZEV allowance vehicles. The staff is proposing the establishment of multipliers for the introduction of partial ZEV allowance vehicles (PZEVs) that would provide extra allowances for PZEVs in the early years. The proposed phase-in level is 25 percent of the current requirement in 2003, 50 percent in 2004, 75 percent in 2005, and 100 percent in 2006. In addition, the existing SULEV intermediate compliance standards would apply to all 2005 and earlier model-year PZEVs. Manufacturers would also be provided two years to make up a PZEV shortfall rather than the one year allowed under the current regulation.

Introduction of ZEVs. Several proposed changes would have the overall effect of reducing the number of ZEVs required, especially in the early years of the program. First, the range and phase-in multipliers would be decoupled; the replacement range multiplier is discussed below. ZEVs introduced before the 2006 model year would receive multipliers of 4.0 for the 2001 and 2002 model years and 1.25 for the 2003-2005 model years.

The credits earned by neighborhood electric vehicles (NEVs), which have a top speed of no more than 25 miles per hour, would be reduced to 0.5 for the 2004 and 2005 model years. For 2006 and subsequent years the credit would be further reduced to 0.15.

Staff is also proposing that the 10 percent ZEV requirement for large and medium-duty manufacturers be ramped up to 11 percent for the 2009-2011 model years, 12 percent for the 2012-2014 model years, 14 percent for the 2015-2017 model years, and 16 percent for 2018 and subsequent model years.

Allow hybrid-electric vehicles with an all electric range of 20 miles or more to satisfy the ZEV requirement. Staff proposes that hybrid-electric vehicles that have an all electric range of 20 miles or more, and also meet the basic PZEV requirements, be allowed to satisfy the 4 percent ZEV requirement. The credits earned by such vehicles would be calculated according to their zero emission range, adjusted to reflect the fact that the effective range of such vehicles is greater than that of pure battery electric vehicles due to their hybrid powertrain.

Allow advanced technologies to satisfy part of the 4 percent ZEV requirement. Staff proposes that certain other advanced technologies that are not ZEVs be allowed to satisfy up to one half of the 4 percent portion of the ZEV requirement. The advanced technologies would be any PZEV qualifying for an allowance of 0.4 or more (before any multipliers), and allowances earned by manufacturers due to placing vehicles as part of a “transportation system”. (Under other proposed revisions outlined below, power-assist hybrid-electric vehicles would earn an allowance of 0.45, and thus would be eligible to take advantage of this option.) The current mechanism under which a PZEV earning a score of 1.0 is considered a full ZEV allowance vehicle, not subject to the 60 percent limit for PZEV allowances, would be eliminated.

Staff also proposes that manufacturers that meet an accelerated PZEV phase-in schedule (50 percent of the current requirement in 2003 and 100 percent of the current requirement in 2004) be granted an additional 2 years to make up any shortfall in their use of the advanced technology PZEV option in 2003 and 2004.

As the ZEV requirement increases over time starting in the 2009 model year, staff proposes that the portion that can be satisfied by 0.2 allowance PZEVs be held at 6 percent. Thus the “ZEV” portion would gradually increase from

4 percent in the 2003 through 2008 model years to 10 percent by 2018. Staff proposes that up to one half of this ZEV portion could be satisfied by advanced technologies. Thus the amount that could be offset would be 2 percent in the 2003 model year, increasing to 5 percent in 2018.

Modify the ZEV range credit. The proposal would modify the ZEV range credit to reduce the minimum range needed for multiple credits to 50 miles. As range increases from 50 miles to 275 miles, the credit would increase from 1 to 10. Because vehicles with a refueling time of less than 10 minutes earn the maximum credit regardless of range, a hydrogen fuel cell vehicle would earn 10 credits, not including any phase-in multiplier.

Provide additional credits for vehicles in California service for more than three years with an extended battery/fuel cell stack warranty. Under the proposal a manufacturer would receive a credit of 0.1 times the original credit value of the vehicle for each year that a vehicle remains in service in California past three years with extended warranty coverage on the battery or fuel cell stack. The credit would be earned at the end of the year of service, and would be available for use in the following year.

Increase the advanced ZEV componentry allowance for PZEVs. The current regulation provides an allowance of 0.1 for vehicles that do not qualify for a zero-emission VMT allowance but are equipped with advanced ZEV componentry. The proposal would increase the advanced ZEV componentry allowance to 0.25. Thus a PZEV power-assist hybrid-electric vehicle would earn an allowance of 0.45, before any phase-in multipliers.

Provide credit multiplier based on vehicle efficiency, phased in beginning in 2005. The existing regulation does not address vehicle energy efficiency directly, but does so indirectly with the range multiplier. The proposal would establish an efficiency multiplier that would partially replace the range multiplier on a phased-in basis beginning in 2005. The efficiency multiplier would be limited to ZEVs and advanced technology PZEVs (PZEVs qualifying for an allowance of 0.4 or more, before any multipliers). All vehicle efficiencies (gasoline, CNG, electric) would be converted into the common units of miles per gallon equivalent (mpeg). In order to earn any credit, a vehicle would have to have an efficiency that is at greater than a baseline level. The multiplier earned would be the larger of 1.0 or the vehicle mpeg divided by the baseline. For ZEVs, as the efficiency multiplier is phased in, the range multiplier would be reduced to one half of its initial value. For PZEVs, the efficiency multiplier would be in addition to the current scores earned.

Provide allowances for vehicles placed in an approved demonstration program. Staff proposes that vehicles placed in advanced technology demonstration programs (e.g., Fuel Cell Partnership vehicles) earn ZEV allowances even if they are not “delivered for sale”.

Require vehicle placement in order to earn multiple allowances. Under the proposal, vehicles that are "delivered for sale" but not actually placed in service would earn only one allowance. Multiple allowances would only be available to vehicles that are actually placed in service in California. To earn multiple allowances, manufacturers would be required to certify to the Executive Officer the number of vehicles placed in service during the course of the model year.

Provide certainty for the sales volume number used to determine the ZEV obligation. Under the current regulation, the ZEV obligation for a manufacturer in a given model year is based upon the number of passenger cars and light-duty trucks sold by the manufacturer in that same model year. As a result the exact obligation is not known in advance, which complicates compliance planning. In order to provide greater certainty, the proposed amendments would make the sales volume used to determine manufacturers' ZEV obligation in a given year a function of vehicle sales in a prior year, and freeze the volume number for three years at a time. This change would be limited only to the determination of the sales volume against which the ZEV percentage requirements are assessed in a given year. It would not affect the determination of manufacturer status (large vs. intermediate vs. small), which is handled separately.

Changes pertaining to manufacturer categories. The proposal would increase the maximum size cut-off for an intermediate volume manufacturer from 35,000 to 60,000 new light- and medium-duty vehicles per model year. When a manufacturer transitions from intermediate to large volume manufacturer, there would be no "pure" ZEV obligation for the manufacturer until the sixth model year after three consecutive model years over the large manufacturer threshold. An independently owned manufacturer with California sales of light- and medium-duty vehicles not exceeding 10,000 per year would not be subject to the ZEV requirement.

Effect of Proposed Modifications

Staff has estimated the number of vehicles that would be required under the current regulation, using the "base case" assumptions from the August 7, 2000 ZEV Biennial Review staff report (1998 production total and market share, MOA full function vehicles, no early introduction, 4 percent ZEVs from all large manufacturers). Under these assumptions, for model year 2003 roughly 22,000 ZEVs would have to be produced assuming 100 percent full function vehicles, and about 38,600 ZEVs would have to be produced if the manufacturers built 100 percent City EVs or NEVs. In addition, large manufacturers would produce about 290,000 PZEVs, and intermediate manufacturers would produce another 90,000.

Using the same assumptions, staff has estimated the number of vehicles that would be required in 2003 under the proposed amendments. Staff has prepared

estimates for two scenarios. The first assumes full 4 percent ZEV production (no use of the 2 percent advanced technology PZEV option). Under this scenario, the number of ZEVs in 2003 is roughly 9,300 for full-function EVs, 23,500 for City EVs, or 30,900 for NEVs. The number of PZEVs in 2003 is roughly 72,000 for large manufacturers plus 22,500 for intermediate manufacturers.

The second scenario for implementation of the proposed amendments assumes that manufacturers take full advantage of the option to offset 2 percent of their ZEV requirement using advanced technology PZEVs. For purposes of this scenario we assume that the advanced technology PZEVs offered for sale in 2003 would be PZEV versions of power-assist hybrid-electric vehicles such as the Prius or Insight. Under this scenario the number of ZEVs is 4,650 assuming full function, 11,750 assuming City EVs, and 15,500 assuming NEVs. In addition staff estimates basic (0.2 allowance) PZEV production of about 72,000 for large manufacturers plus 22,500 for intermediate manufacturers. Finally, under this scenario manufacturers would produce about 10,700 advanced technology PZEVs.

Adding up the total cost of the program (ZEV, PZEV and advanced-technology PZEV production), the savings resulting from the proposed amendments in model year 2003 range from about $130 million (for a manufacturer that meets its ZEV obligation with 100 percent NEVs under both the current and amended regulation) to more than $400 million (for a manufacturer that meets its ZEV obligation with 100 percent full function EVs under both scenarios). The savings in model year 2004 would be less than in 2003, due to the increased volume of PZEV production required as the PZEV phase-in multiplier is reduced. The distribution of the savings among manufacturers, dealerships, vehicle purchasers and subsidy providers has not been estimated.

Staff has estimated the 2010 and 2020 emissions impact of the staff proposal as compared to the current regulation, for the South Coast Air Basin. This estimate assumes full use by manufacturers of the advanced technology vehicle option, because that is expected to be the option that manufacturers would pursue over the long term.

The net emission impact of the staff proposal is made up of two components. First, there is the effect of the proposed changes to the “four percent” portion of the regulation (ZEVs and AT PZEVs). These changes result in a decrease in the number of ZEVs and an increase in the number of AT PZEVs, as compared to the current regulation. The second component of the emission impact is the effect of the proposed changes to the “six percent” portion of the regulation (0.2 allowance PZEVs). Here, because of the PZEV phase-in, the staff proposal would result in a decrease in the number of PZEVs produced over model years 2003 through 2005.

Staff estimates that the staff proposal would result in a 2010 net increase of about 0.14 tons per day of direct emissions, as compared to the current regulation. It is important to note, however, that this increase is almost entirely (more than 95 percent) due to the PZEV phase-in. With regard to indirect emissions in 2010, the staff proposal would result in an increase of less than 0.05 tons per day, which is the net result of a decrease in the number of pure ZEV vehicles and an increase in the number of advanced technology PZEV vehicles. For 2020, staff estimates that the modifications in the staff proposal would result in a decrease of 0.08 tons per day in direct emissions. No 2020 estimate is available for indirect emissions.

Staff Recommendation

The staff recommends that the Board adopt the modifications as proposed in this Initial Statement of Reasons. The proposed modifications maintain a core ZEV component, but significantly reduce the total cost of the program

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Initial Statement of Reasons
December 8, 2000

1. INTRODUCTION

In 1990, California embarked on an ambitious strategy to reduce vehicle emissions to zero. This objective was to be achieved through the gradual introduction of electric vehicles into the California fleet. Specifically, the Air Resources Board mandated that at least 2 percent, 5 percent and 10 percent of new car sales be zero-emitting by 1998, 2001 and 2003, respectively.

The Zero Emission Vehicle (ZEV) mandate for passenger cars has been adjusted twice since then, in 1996 and 1998. The underlying goal, however, has not changed. California remains committed to achieving zero emissions performance wherever feasible in the vehicle fleet. The challenge is determining how to achieve sustainable success in the field.

As evidence of the State's commitment, California has partially subsidized the introduction of battery electric vehicles through grants and fleet purchases. Most recently, AB 2061 (stats. 2000, ch. 1072; Lowenthal) appropriated $18 million to provide grants of up to $9,000 per vehicle for vehicles leased or purchased between now and 2003.

The rationale for California's commitment is simple. Over the long term, zero-emission technology is necessary to achieve the State's public health protection goals. Health-based state and federal air quality standards continue to be exceeded in regions throughout California, and more areas of the State are likely to be designated as nonattainment with promulgation of the new federal eight-hour ozone standard. California's burgeoning population and robust economy mean continued upward pressure on statewide emissions. Manufacturing, power generation, petroleum refining, goods transport, home heating and cooling, personal mobility and a wide range of human activities all have direct air pollution consequences. Accomplishing zero emissions in any of these source categories (or portion thereof) mitigates their adverse impacts and protects human health.

Zero-emission technologies also transcend some of the persistent problems with conventional air pollution sources. Combustion-based engines are inherently higher emitting and prone to deterioration over time. Catastrophic failures are also a concern. Older gasoline-powered vehicles, for example, become gross emitters if their emission control systems fail. Combustible fuels also have significant "upstream" impacts. Refining, fuel storage and delivery all have associated emissions from both routine operations, accidents (breakdowns, fuel spills), and ongoing compliance problems (e.g., leaking underground tanks). Apart from upset conditions that may occur during electric power generation, zero emission vehicles have none of these vulnerabilities. A battery powered electric car will remain emission-free throughout its useful life.

Although ZEVs offer significant long term environmental benefits, and great technological progress has been made since the regulation was first adopted,

progress has been less pronounced on the economic side. As a result, several issues must be confronted as we assess their potential for near term widespread introduction. First of all, staff's cost analysis concludes that both the initial and lifecycle costs of battery electric vehicles (EVs) will significantly exceed those of comparable conventional vehicles in the 2003 timeframe. Battery costs are high and will not meet cost-competitive targets for some time. Overall, the market for battery EVs is just starting to be understood and is very difficult to quantify. The 2003 ZEV mandate represents a ten-fold increase in the number of actual battery EVs on the road. Placing all of those vehicles within a year or two and sustaining those sales in 2004, 2005 and beyond is a significant marketing challenge by anyone's measure. With respect to PZEVs, manufacturers have testified that due to technical challenges, lead time, and other considerations, they will not all be able to take full advantage of the allowable 6 percent partial ZEV allowance vehicle (PZEV) offset in the early years.

At a Board meeting held on September 7 and 8, 2000, the Air Resources Board considered the status of the Zero Emission Vehicle program. After hearing extensive testimony and public comment, the Board by unanimous vote adopted a resolution affirming that the ZEV program is an essential component of the State's long-term air quality strategy. (A copy of the Board's resolution is included in this Staff Report as Appendix B.) The Board further resolved that the basic ZEV requirements be retained and implemented in California. Finally, the Board directed staff to develop and propose regulatory modifications and other steps that address the challenges associated with the successful long-term implementation of the ZEV program, and that result in a sustainable market for ZEVs.

In response to the Board's directive, staff has developed recommendations to be brought before the Board at a January 25, 2001 public hearing. The staff proposal, and its rationale, are presented in this Staff Report.

2. BACKGROUND

2.1 Air Quality in California

Air quality in California has improved dramatically over the past 25 years, largely due to continued progress in controlling pollution from motor vehicles. Faced with ever more stringent regulations, vehicle manufacturers have made remarkable advances in vehicle technology. Several thousand zero-emission vehicles are now in everyday service on California roads, and the latest conventional internal combustion engine vehicles achieve emission levels that seemed impossible just a few short years ago.

Despite this progress, however, air quality in many areas of the state still does not meet federal or state health-based ambient air quality standards. Mobile sources still are responsible for well over half the ozone-forming emissions in California. The relative contribution of passenger cars and small trucks is expected to decline over time as new standards phase in, but in 2020 such vehicles will still be responsible for about 10 percent of total emissions. State and federal law requires the implementation of control strategies to attain ambient air quality standards as quickly as practicable.

Mobile sources are also the primary source of emissions of toxic air contaminants in California, and a major contributor to greenhouse gas emissions. The facilities needed to refuel the current vehicle fleet (service stations, bulk terminals, refineries) are significant sources of smog precursors, air toxics, water pollution, and hazardous waste.

2.2 Zero Emission Vehicle Program

The ZEV program was originally adopted in 1990, as part of the first ARB Low-Emission Vehicle regulations. The ZEV program is an integral part of California's mobile source control efforts, and is intended to encourage the development of advanced technologies that will secure increasing air quality benefits for California now and into the future.

Under the 1990 regulations, the seven largest auto manufacturers were required to produce ZEVs beginning with model year 1998. In model years 1998 through 2000, two percent of the vehicles offered for sale in California by large volume manufacturers were to be ZEVs, and this percentage was to increase to five percent in model years 2001 and 2002, and ten percent in model years 2003 and beyond.

In 1996 the ARB modified the regulations to allow additional time for the technology to develop. The requirement for ten percent ZEVs in model years 2003 and beyond was maintained, but the sales requirement for model years 1998 through 2002 was eliminated. At that same time, the ARB entered into Memoranda of Agreement (MOAs) with the seven largest vehicle manufacturers. Under the MOAs the

manufacturers must place more than 1,800 advanced-battery EVs in California in the years 1998 through 2000, and the ARB must work with state and local governments to help develop ZEV infrastructure and remove barriers to ZEV introduction.

In 1998 the ARB provided additional flexibility in the ZEV program by allowing additional types of vehicles to be used to meet program requirements. Under the 1998 amendments, manufacturers can use extremely clean vehicles--PZEVs--to meet the 10 percent ZEV requirement, except that large-volume manufacturers must, at a minimum, have 4 percent of their sales be vehicles classified as “full” ZEVs.

Other aspects of the program provide additional options to manufacturers. Auto companies can earn extra ZEV credits by introducing vehicles before 2003, thereby reducing their total obligation. Extra credit is also available for battery electric vehicles with more than a 100 mile range per charge. Manufacturers may also delay compliance by one year provided they produce two years’ worth of ZEVs by the end of 2004.

If no change is made to today’s ZEV regulation, staff estimates that approximately 22,000 full function electric vehicles would need to be offered for sale in 2003 to meet a four percent ZEV requirement. However, this total could change significantly, up or down, based on each manufacturer’s actual production decisions and their chosen compliance path. As noted above, early ZEV introduction or the use of additional vehicles with extended range would decrease the 2003 obligation. Reduced reliance on PZEVs, on the other hand, would increase the number of ZEVs needed. Widespread use of City EVs or neighborhood electric vehicles (NEVs) also would increase the required number of EVs, because such vehicles earn fewer credits per vehicle than the full function EVs that are the basis of the 22,000 estimate.

The ZEV mandate continues in 2004 and each year thereafter. If the rule is unchanged, staff estimates that ZEV production (again expressed in terms of full function vehicles, at the 4 percent level) will reach 31,000 in 2006, and 39,000 in 2008 and beyond.

2.3 2000 Biennial Review Process

When the ZEV mandate was adopted in 1990, electric vehicles were in a very early stage of development. To ensure successful implementation, the Board directed staff to report biennially on the status of technological progress. The September 2000 biennial review was the fifth in-depth examination of the technical and economic issues related to ZEVs. Since auto makers generally need three years’ lead time for production, this most recent biennial review was also the last significant opportunity to assess their readiness for meeting the 2003 requirements.

Staff undertook a significant effort to provide a thorough, accurate portrayal of the current status of ZEV technology and the prospects for improvement in the near- and long-term. Throughout the review process, the ARB has been committed to working closely with all interested parties to ensure that they have an opportunity to provide comments and suggestions. The key milestones of the review process were as follows:

March 29, 2000	Public Workshop Background Information for the September Review Sacramento
March 30, 2000	Public Workshop Multi-Manufacturer Ownership Arrangements Sacramento
May 31-June 1, 2000	Public Workshop Background Information for the September Review Diamond Bar
August 7, 2000	Staff Report released to the public
September 7, 2000	Board Meeting Sacramento

Staff efforts have included meetings with vehicle manufacturers, environmental groups, and other interested parties, on-site visits to the large vehicle manufacturers in Japan and in Michigan, discussions with EV drivers, and research on current and pending technologies and their environmental impacts. ARB also contracted with outside technical experts to review the state of battery technology and production costs, and assess the full fuel cycle emissions and energy efficiency of various vehicle types and fuel sources.

Among the major points noted in the staff assessment were the following:

ZEVs provide comprehensive environmental, energy and societal benefits. With respect to the environment, ZEVs are the “gold standard” for vehicular air pollution control. They reduce both criteria and toxic pollutant emissions to the maximum feasible levels. High-efficiency ZEVs and hybrid electric near-ZEVs also cut emissions of carbon dioxide and other greenhouse gases. Finally, ZEVs minimize the multi-media impacts of vehicle operation, eliminating the need for a whole host of upstream petroleum refinery, storage and delivery activities. Admittedly, ZEVs have their own upstream impacts related to power generation and create new waste disposal issues. However, on an overall lifecycle basis in California, they are environmentally superior to conventional automobiles. As California’s power generation system becomes increasingly cleaner, so too will the upstream emissions associated with ZEVs. Regarding energy use, vehicles

powered by grid electricity increase the diversity of California's transportation energy system. This reduces the State's dependence on foreign oil and contributes to greater stability in the overall transportation fuels market. Advanced battery ZEVs and hybrid electric near-ZEV technologies are also highly efficient; reducing absolute energy demand per mile of vehicle operation. Finally, ZEVs have the potential to be powered by renewable sources of energy such as wind, hydropower or solar energy. The societal benefits of ZEVs include their clean, quiet operation in neighborhoods and on city streets. ZEVs can also benefit the State's economy. Because of their high technology leadership, California companies have the technical and scientific capability to play significant roles in the design, development and production of advanced technology zero emission components and vehicles.

Batteries are the single most expensive component of electric vehicles. For that reason, affordable battery packs--both today and when produced in volume--are crucial to achieving a sustainable electric vehicle market. ARB contracted with a team of outside experts to obtain the best available information on battery advances, costs and future trends. The Battery Panel concluded that nickel metal hydride (NiMH) batteries were the most promising advanced technology, having both high performance and the longest useful life. Unfortunately, the Panel also concluded that battery costs are high and will not meet cost-competitive targets for some time. Although volume production will help, a breakthrough is needed to achieve truly affordable NiMH packs.

Today's ZEVs are more costly for manufacturers to make than any other vehicle technology being produced for sale between now and 2003. As noted above, most of that cost differential stems from the battery pack. The cost gap will narrow as technology improves and manufacturers move to volume production. However, there is no getting around the fact that near-term ZEVs will be relatively more expensive to produce. Staff estimates that the incremental costs for ZEVs in 2003 will range from $7,500 for City EVs, up to more than $20,000 for freeway capable ZEVs with advanced NiMH batteries. These calculations exclude the costs incurred for research and development of each ZEV model. Under an optimistic but nonetheless plausible scenario, battery EVs could become cost-competitive with conventional vehicles on a lifecycle cost basis. This scenario assumes volume production of more than 100,000 ZEVs per year.

There is significant disagreement over the extent of market demand for electric vehicles. Manufacturers assert that the lack of leases during the first years when vehicles were available means that the market can only absorb a few hundred ZEVs per year. Electric vehicle advocates and fleet operators point to current waiting lists as evidence of strong customer interest and pent-up demand. Staff views this as the most difficult area in which to develop reliable estimates. The entire market is new and product availability has been constrained such that true consumer interest is exceedingly difficult to gauge. The recent emergence of fundamentally new ZEVs–namely City EVs and neighborhood EVs–further

complicates staff's assessment. Although the business case for inexpensive, in-town EVs appears to be promising, there is as yet no market experience for selling these products in the U.S. Manufacturers will have to start from scratch in building consumer awareness and interest.

2.4 September 7, 2000 Board Meeting

At its September 7 and 8 meeting, the Air Resources Board considered the status of the Zero Emission Vehicle program. After hearing extensive testimony and public comment, the Board by unanimous vote adopted a resolution affirming that the ZEV program is an essential component of the State's long-term air quality strategy. The Board further resolved that the basic ZEV requirements be retained and implemented in California. Finally, the Board directed staff to develop and propose regulatory modifications and other steps that address the challenges associated with the successful long-term implementation of the ZEV program, and that result in a sustainable market for ZEVs. In particular the Board identified the need for near-term product availability and market stability, the need to greatly enhance public education regarding the attributes and benefits of ZEV technologies, and the need to reduce or mitigate the high initial costs of vehicles and batteries in low-volume production.

In response to the Board's directive, staff has developed recommendations to be brought before the Board at a January 25, 2001 public hearing. Major milestones in the regulatory process are as follows:

October 25, 2000	Public Workshop Possible Modifications to the Zero Emission Vehicle Program Regulations El Monte
December 8, 2000	Initial Statement of Reasons
January 25, 2001	Board Hearing Sacramento

The January 25 Board Hearing will focus on proposed changes to the zero emission vehicle regulations. Other non-regulatory measures such as incentives, public education, or market development will be addressed separately. Additional information regarding the development and consideration of such non-regulatory measures will be provided as it becomes available.

2.5 Staff Objectives

Over the course of the Biennial Review, staff has gathered a tremendous amount of background material and has had extensive dialogue with interested parties. Taken as a whole, this information provides a comprehensive overview of the

way in which zero and near-zero emission vehicle technologies have progressed over the 10 years since the original ZEV program requirements were adopted. As should be expected, the nature and direction of research and development have varied from what was anticipated in 1990. For example, while there have been tremendous advances in battery performance and life, costs have not declined to the same extent. Because of battery cost issues, new types of smaller battery vehicles, not contemplated at that time, have been developed and are being actively pursued by manufacturers. On the hybrid front, power assist hybrid vehicles have been aggressively pursued, with the result that two high efficiency hybrids are commercially available and several others have been announced. Grid-connect hybrid vehicles, on the other hand, have received relatively little interest from most manufacturers. Conventional vehicles have had dramatic improvement in their emission performance, resulting in vehicles with extended durability and extremely low emission levels. Finally, fuel cell vehicles and their related infrastructure are perhaps the central focus of development efforts at the major automobile manufacturers. Thus there are many different technologies being pursued, with varying degrees of interest and in varying stages of development and commercialization. Across all advanced vehicle types, however, there are at least some constraints on widespread introduction in 2003 due to cost, development lead time, or other factors.

From a policy standpoint, staff believes that several conclusions emerge from this picture. First of all, as was clearly articulated by the Board, we need to maintain a core zero emission requirement to provide an incentive for further development. The tremendous progress that has been seen can at least in part be attributed to the existence of the ZEV requirement, and staff believes that maintaining this requirement will accelerate the pace at which true zero technologies are commercialized. Second, given the wide-open nature of ongoing technical advances, the program should provide increased flexibility for manufacturers to pursue specific strategies that in their view offer long term promise. Third, the program should acknowledge near term constraints due to vehicle cost and availability.

More specifically, our objectives at this point, in response to the Board's directives, are to:

- Provide incentives for ongoing technology advancement, across a wide variety of vehicle types (both ZEVs and PZEVs),
- Maintain the visibility and momentum of the ZEV program during this period of further development,
- Ensure that an adequate number of battery EVs is available in the near term to explore many different possible market applications,
- Take advantage of the air quality benefits afforded by available PZEV technology, and
- Adjust the near term production requirements to better correspond to PZEV availability and the emerging market for ZEVs.

From an operational standpoint, we also recommend that the credit calculation mechanism reflect the following:

- A new “advanced technology PZEV” option, under which high scoring PZEVs can be used to satisfy a portion of the 4 percent requirement,
- A “base case” 2003 vehicle total of about 10,000 vehicles, assuming 100 percent full function vehicles, no early introduction, and 4 percent ZEVs for all large volume manufacturers. (This set of assumptions corresponds to the 22,000 figure under the current regulation, and does not include the effect of allowing advanced technology PZEVs to count towards the 4 percent),
- Early introduction credits for 2001 and 2002 that exceed those available under the current regulation, and
- Credit scores for NEVs, City EVs, full function EVs and PZEVs that reasonably mirror the relative cost and functional differences among the various vehicle types.

3. SUMMARY OF PROPOSED AMENDMENTS

To achieve the objectives identified above, staff proposes that the Board adopt two basic types of modifications to the program. First, we propose that the Board adjust the rate and timing of ZEV and PZEV introduction to better reflect the near-term realities of cost and availability. Second, we propose that the Board adjust the credit calculation mechanism and the incentives that it provides. We also propose that the Board adopt several miscellaneous administrative and cleanup changes.

3.1 Adjust rate and timing of ZEV and PZEV introduction.

Staff proposes that the Board reduce the number of vehicles required, especially in the early years of the program. Specific proposed changes are as follows:

3.1.1 Phase in PZEV introduction

The staff proposal would phase in over four years the number of vehicles needed to take full advantage of the PZEV option (60 percent of the 10 percent ZEV mandate can be met with vehicles that are not zero emission). The proposed phase-in is 25 percent of the current requirement in 2003, 50 percent in 2004, and 75 percent in 2005, and 100 percent in 2006. This would be accomplished by introducing phase-in multipliers for all PZEVs, as shown in Table 3-1.

Table 3-1
PZEV Phase-In Multipliers

	2003	2004	2005	2006
Allowance Multiplier	4.0	2.0	1.33	1.0

The 4.0 multiplier would also apply to PZEV vehicles introduced prior to 2003, and would retroactively apply to vehicles already introduced.

As part of this phase-in, staff proposes that the Board provide intermediate in-use compliance standards for early PZEVs, by extending the existing SULEV intermediate compliance standards to apply to PZEVs certified in model years prior to 2006. This reduces the risk to a manufacturer of recall should in use emissions exceed those experienced during development and certification.

The staff proposal also would provide an additional “carry-back” year, so that manufacturers have two years to make up a PZEV shortfall rather than the one year allowed under the current regulation.

These changes are recommended in recognition of constraints on the number of PZEVs that can be produced in the early years, due to lead time, design challenges, and other factors.

3.1.2 Phase in ZEV introduction

Staff proposes that the Board reduce the number of ZEVs required, particularly in the early years of the program. This reduction would be the result of the combined operation of several proposed changes.

First, the staff proposal "decouples" the range multiplier and the phase-in multiplier. Under the current regulation, these two variables are combined into a single factor, which provides a multiplier that varies according to vehicle range and the year of vehicle introduction. We propose that the Board separate these two variables. We make this suggestion in order to simplify the regulation and reduce the importance of range in determining the overall vehicle score.

The staff proposed range multiplier is discussed in Section 3.2.2 below. The proposed ZEV phase-in multipliers (which reduce the number of ZEVs needed to meet the 4 percent requirement and any additional ZEV requirement that may result if the full 6 percent PZEV option is not used) are as shown in Table 3-2.

Table 3-2
ZEV Phase-In Multipliers

	2001-2002	2003-2005	2006 and beyond
Credit Multiplier	4.0	1.25	1.0

This change is recommended to further encourage the early introduction of vehicles, address the Board's concerns regarding the cost impact of the program on vehicle manufacturers, particularly in the early years, and make it more likely that the required number of vehicles can be successfully placed. The effect of these changes on the required number of vehicles is discussed in Section 3.4.1 below.

3.1.3 Reduce Future NEV Credits

Under the current regulation, the credit value for NEVs, given their cost and functionality, is high relative to that for other vehicle categories. Staff explored increasing the credits earned by other vehicle types in order to provide a more appropriate credit ratio. This resulted, however, in credit scores for full function vehicles that were so high that too few such vehicles would be needed to comply with the regulation. Thus in order to correct the disparity it is necessary to reduce the credit earned by NEVs. Staff recognizes, however, that manufacturers need appropriate lead time in order to adjust their product plans in response to any downward revisions to the credits earned by NEVs.

To allow for a transition period, while moving towards a lower credit value for NEVs, staff proposes that the Board establish a ZEV discount multiplier for NEVs, as shown in Table 3.3.

Table 3-3
ZEV Discount Multiplier for NEVs

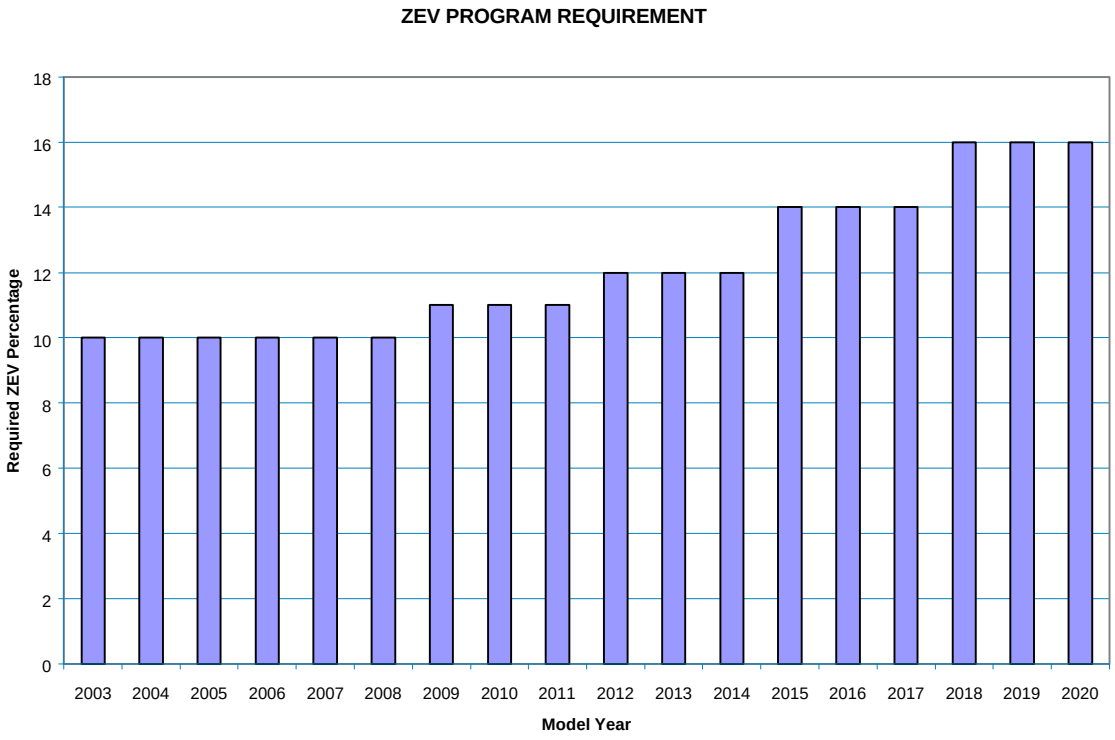
	2004-2005	2006 and beyond
Credit Multiplier	0.5	0.15

Thus the credit value for a NEV (not including the phase-in multipliers) would be 1.0 through 2003, 0.5 in 2004-2005, and 0.15 in 2006 and beyond, assuming that the NEV is placed in service. (Section 3.2.7 below describes a staff proposal that a vehicle be placed in service in order to take advantage of any multipliers). The final value of 0.15 could be adjusted in the future based on additional information regarding how such vehicles are used, the number of trips they replace, and the number of zero emission miles that they accumulate.

3.1.4 Increase ZEV percentage requirement over time

Staff proposes that the Board increase the overall ZEV percentage requirement over time for both large and intermediate volume manufacturers. The proposed schedule, illustrated on Graph 3-1 which follows, ramps up beginning in 2009 and results in a 16 percent overall requirement in 2018. This ramp up will further encourage the commercialization of a number of emerging zero emission and near zero emission technologies now under development.

Graph 3-1



3.2 Modify Incentive Structure

3.2.0 Allow extended range hybrid-electric vehicles with an all electric range of 20 miles or more to satisfy the ZEV requirement

Staff proposes that extended range hybrid-electric vehicles with an all electric range of 20 miles or more, that also meet the basic PZEV requirements, be allowed to satisfy the 4 percent ZEV requirement. The credits earned by such vehicles would be calculated using the ZEV range multiplier, with an adjustment to their tested urban range to reflect the fact that the effective range of such vehicles is greater than that of pure battery electric vehicles due to their hybrid powertrain. Specifically, for purposes of determining the ZEV range multiplier the urban all electric range of an extended range hybrid electric vehicle would be multiplied by 3.5. Thus a 20 mile extended range hybrid electric vehicle would be treated as a ZEV with a range of 70 miles.

3.2.1 Allow other advanced technologies to satisfy part of the ZEV requirement

Staff proposes that the Board allow certain advanced propulsion technologies, that are not ZEVs, to satisfy up to one half of the 4 percent portion of the ZEV requirement. Specifically, under the staff proposal higher scoring PZEVs (vehicles receiving a score of 0.4 or above before any multipliers) and "transportation systems" installations would be eligible to earn ZEV credits.

- Higher scoring PZEVs. In the staff proposal, vehicles with a PZEV score of 0.4 or higher (before the application of any multipliers) are defined as "Advanced Technology PZEVs". Allowances from such vehicles could be used to satisfy up to one half of the four percent requirement. The incentive to build such high credit PZEVs under the current program has been reduced because manufacturers are expected to meet the 6 percent PZEV option using conventional gasoline engine SULEV PZEVs. Vehicles earning 0.4 or above include CNG vehicles (0.4), power assist hybrids (0.45 under the staff proposal—see section 3.2.4 below), and reformer fuel cell vehicles (0.7).

- Transportation systems. This change would grant increased credits to vehicles placed by manufacturers as part of a "transportation system". Such credits would be granted, subject to the Executive Officer's discretion, upon application by a manufacturer. To earn such credits, the manufacturer must demonstrate that the vehicle will be used as a part of an innovative transportation system that will effectively link homes, transit systems and jobs (e.g. a station car). Such systems are to be designed to evaluate the benefits and issues related to the shared use of ZEVs, and the application of new technologies such as reservation management, card systems, depot management, location management, charge billing and real-time wireless information systems.

The approaches listed in this Section 3.2.1 could only be used to satisfy up to one half of the four percent requirement. The remaining one half would need to be met with pure ZEV vehicles.

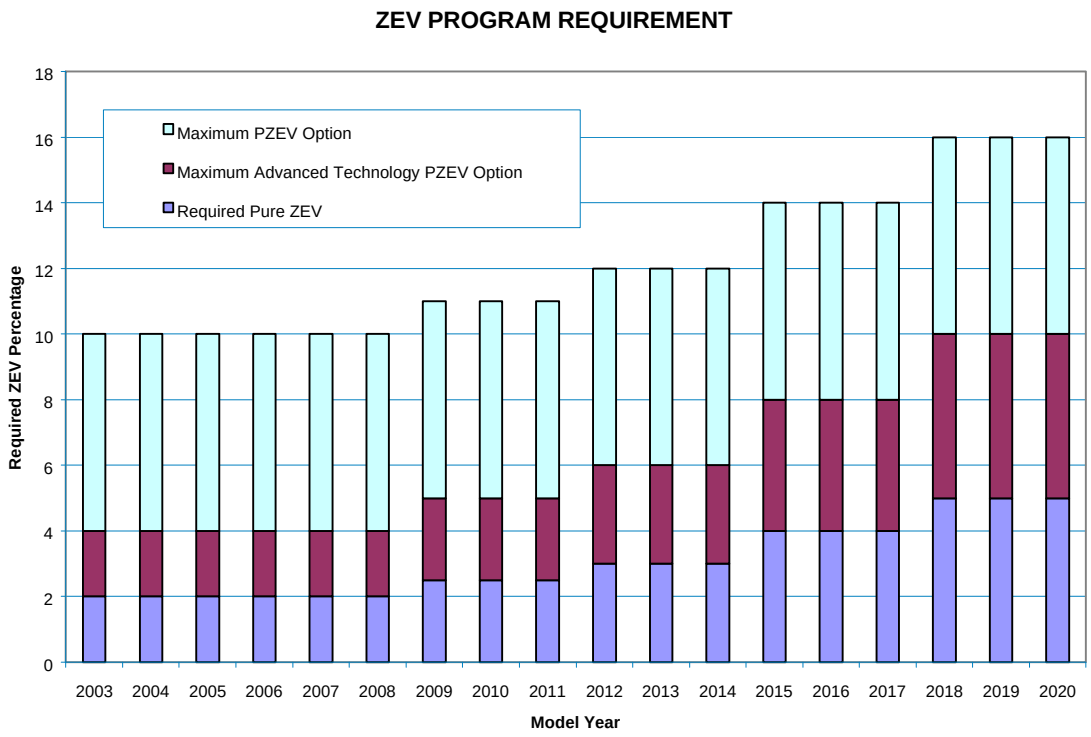
These changes are recommended in order to provide an incentive for continued development of advanced technology PZEV vehicles, and to encourage transportation system approaches that maximize the usage, exposure, and vehicle miles traveled of electric vehicles.

As part of this change we recommend that the Board eliminate the "full ZEV allowance vehicle" concept, because it would no longer serve any purpose. Under that concept, a PZEV earning a score of 1.0 is considered a full ZEV allowance vehicle, and allowance from such vehicles can be used to fully satisfy the ZEV obligation. The staff proposal instead requires that one half of the four percent be set aside for pure ZEV and extended range hybrid electric vehicles only.

Staff also proposes that manufacturers that meet an accelerated PZEV phase-in schedule (50 percent of the current requirement in 2003 and 100 percent of the current requirement in 2004) be granted an additional 2 years to make up any shortfall in their use of the advanced technology PZEV option in 2003 and 2004.

As the ZEV requirement increases over time (from 10 percent in 2003 to 16 percent in 2019), staff proposes that the Board hold the portion that can be satisfied by 0.2 allowance PZEVs at 6 percent. Thus the "ZEV" portion would increase from 4 percent in 2003-2011 to 10 percent in 2019. Under the staff proposal up to one half of this ZEV portion could be satisfied by advanced technology PZEVs. Thus the amount that could be offset would be 2 percent in 2003, increasing to 5 percent in 2019. This is illustrated in the Graph 3-2, which follows.

Graph 3-2



3.2.2 Modify the ZEV range credit

Staff proposes that the ZEV range credit be modified to reduce the minimum range needed for multiple credits to 50 miles. As range increases from 50 miles to 275 miles the credit would increase from 1 to 10. Because vehicles with a refueling time of less than 10 minutes earn the maximum credit regardless of range, under this proposal a hydrogen fuel cell vehicle would earn 10 credits, not including any phase-in multiplier. The staff proposal also includes a conforming change to the PZEV zero emission VMT factor, such that the maximum factor of 1.0 would apply at 50 miles range rather than 100 miles range. Finally, under the staff proposal a ZEV with the demonstrated capacity to accept fuel or electric charge equivalent to at least 60 miles of UDDS range in less than 10 minutes, when starting from 20 percent state of charge, is counted as having 60 additional miles (up to a 275 mile maximum) of range.

The reduction in the minimum range needed to earn multiple credits is recommended in recognition of the fact that lower range vehicles can satisfactorily fill a number of market applications, and to provide a more gradual incentive for range rather than the "all-or nothing" step function at 100 miles used by the current regulation. The increase in the number of range credits is intended to reward the difference in range across different vehicle types, and provide a large incentive for vehicles that can be refueled quickly.

3.2.3 Provide additional in-service credits for ZEVs and zero-emission VMT vehicles that remain in service in California for more than three years, with a battery/fuel cell stack warranty in effect

Staff proposes that additional credits be granted to vehicles, other than NEVs, whose "electrochemical power source" remains under warranty. This would provide an incentive for manufacturers to offer extended warranties, which would protect the consumer from the risk and cost of battery or fuel cell stack replacement. This credit would be limited to vehicles with a true zero emission VMT capability of 20 miles or more. It would apply beginning in the fourth year after the vehicle is placed in service (the initial three year warranty currently offered by vehicle manufacturers would not receive any additional credit).

Specifically, under the staff proposal a manufacturer would receive a credit of 0.1 times the original credit value (excluding any phase-in multipliers) of the vehicle for each year that a vehicle remains in service in California and is covered by a warranty. The credit would be earned at the end of the year of service, and would be available for use in the following year. Thus a vehicle that remains in service and covered under warranty for 13 years would eventually earn additional credits equal to those earned when the vehicle was first placed in service. For example, a vehicle placed in service in 2003, with a credit value of 4.5, would earn an additional credit of 0.45 in 2006 if it is in service and covered by a warranty throughout that year. The credit would be available for use in 2007. The vehicle would earn an additional 0.45 credit for each year that it is in service thereafter, available in the following year.

This change is recommended due to the uncertainty regarding battery life. The proposed approach will encourage manufacturers to provide extended power source warranties. This will transfer the risk, and cost, of battery failure from the vehicle owner to the manufacturer, and remove a possible disincentive to vehicle placement.

The effect of this incentive on the number of vehicles placed is difficult to predict. This point is discussed in Section 3.4.5 below.

3.2.4 Increase the Advanced ZEV Componentry Allowance.

Because the power source warranty credit discussed above is only applicable to vehicles with zero emission range, it would not apply to power assist hybrids. Staff recognizes, however, that given the current state of battery technology it is not clear that the battery pack in a PZEV HEV would last, without replacement, for the 15 years and 150,000 miles that are required to qualify as a PZEV. To address the cost of battery replacement, staff proposes that the Board increase the advanced ZEV componentry allowance to 0.25. Thus a PZEV power assist hybrid vehicle would earn an allowance of 0.45, before any phase in multipliers. The current regulation provides an allowance of 0.1 for vehicles that do not qualify for a zero-emission VMT allowance but are equipped with advanced ZEV componentry.

3.2.5 Provide an allowance multiplier based on vehicle efficiency, phased in beginning in 2006

The existing regulation does not address vehicle energy efficiency directly, but does so indirectly with the range multiplier. Staff proposes that the Board define an efficiency multiplier that would replace the range multiplier on a phased-in basis beginning in 2006. Under the proposed allowance mechanism, all vehicle efficiencies (gasoline, CNG, electric) are converted into the common units of miles per gallon equivalent (mpeg). The mpeg value is calculated as follows:

- Gasoline fueled vehicles: Unadjusted, combined EPA fuel economy. 1/[(.55 x unadjusted EPA city mpg plus .45 x unadjusted EPA highway mpg)].
- Battery ZEVs and grid-connect hybrids: 33,705 divided by (.55 x AC Whr/mile city plus .45 x AC Whr/mile highway).
- Alternate fuel vehicles: Combined fuel economy as determined in accordance with 49 CFR 600, excluding the federal “fuel content” factor.
- Flexible or dual fuel vehicles: The lower of the values for the fuels used.

In order to earn any allowance, a vehicle must have an efficiency that is greater than a baseline level established in proportion to CAFÉ requirements. The multiplier earned would be the larger of 1.0 or the vehicle mpeg divided by the baseline. The baseline requirements are as shown in Table 3-4.

Table 3-4
Vehicle Efficiency Baseline Requirements

Category	Passenger Seats	Baseline
PC or LDT, less than 3750 lbs.	Fewer than 4	44.000 (1.60 x 27.5)
PC or LDT, less than 3750 lbs.	4 or more	38.500 (1.40 x 27.5)
LDT, 3751-5750 lbs.	Fewer than 4	34.375 (1.25 x 27.5)
LDT, 3751-5750 lbs.	4 or more	28.875 (1.05 x 27.5)
LDT and MDV, 5750-8500 lbs.	Any	20.625 (0.75 x 27.5)

For example, the Toyota RAV4 EV, with miles per gallon equivalent efficiency of 77.4, would earn an efficiency multiplier of 77.4 divided by 28.875, or 2.68.

Under this proposed methodology, the efficiency multiplier earned by various current and proposed vehicles, based on available information regarding their fuel economy, would be as shown in Table 3-5.

Table 3-5
Estimated Vehicle Efficiency Multipliers

Vehicle	Class	Passengers	MPEG	Estimated Efficiency Multiplier
EV1 Panasonic	< 3750	2	99-135	2.25-3.06
City EV (estimated)	< 3750	2	95	2.17
Altra	3751-5750	4	87-105	3.02-3.64
EV Plus	3751-5750	4	74-78	2.57-2.72
RAV4 EV	3751-5750	4	77	2.68
Ranger EV	3751-5750	3	69	2.01
S 10 NiMH	3751-5750	3	42-62	1.22-1.81
EPIC	> 5750	5	43-48	1.48-1.67
Insight PZEV	< 3750	2	76.5	1.74
Prius PZEV	< 3750	4	57.7	1.50
Nissan Sentra CA	< 3750	4	34.9	1.00
Escape HEV PZEV	3751-5750	4	41.2	1.43
Durango HEV	> 5750	4	21.8	1.06

Please note that many of the values in this table are unconfirmed or are based on best estimates. Actual tested mileage, and the resulting multiplier, may vary from the values shown.

This change is proposed to encourage greater vehicle efficiency, which provides a number of benefits. For electric vehicles, increased efficiency results in greater range for any given pack capacity, and reduced upstream emissions. For gasoline vehicles, increased efficiency not only results in lower upstream emissions, but it also means reduced tailpipe emissions of greenhouse gases.

Staff proposes that the efficiency multiplier be phased in over a four year period, beginning in 2005. For ZEVs, the efficiency multiplier would replace one half of the range multiplier over time. That is, as the efficiency multiplier is phased in, the range multiplier would be reduced to one half of its initial value. For PZEVs, the efficiency multiplier would be in addition to the current scores earned.

The specific phasing multipliers for ZEVs are as shown in Table 3-6.

Table 3-6
ZEV Efficiency Multiplier Phase-In

	2004	2005	2006	2007	2008
Range	1.0	0.875	0.75	0.625	0.5
Efficiency	0.0	0.25	0.5	0.75	1.0

For example, in 2005 the allowances earned by a vehicle would be the sum of .875 times the range score, plus .25 times the efficiency score.

This phase-in relationship is recommended in order to hold the required number of vehicles at approximately the same level before and after the introduction of the efficiency factor. Under the proposed mechanism, efficiency scores would range from1 to about 3. This is roughly one-half of the range of scores that would be earned under the proposed range credit. In general, staff expects that the combined scores under the range plus efficiency scoring mechanism would approximate those earned under the range-only approach. The scores for individual vehicles would vary, of course, depending on their relative performance.

3.2.6 Allow credits for vehicles placed in an approved demonstration program

Staff proposes that the Board allow vehicles placed in advanced technology demonstration programs (e.g. Fuel Cell Partnership vehicles) to earn ZEV credits even if they are not “delivered for sale”. To earn such credits, the manufacturer must demonstrate to the reasonable satisfaction of the Executive Officer that the vehicles will be regularly used in applications appropriate to evaluate issues related to safety, infrastructure, fuel specifications or public education. Such a

vehicle is eligible to receive the same allowances that it would have earned if placed in service.

This change is proposed in order to provide a reward within the ZEV program for production of early prototype vehicles, and thereby recognize the manufacturers' efforts in these areas.

3.2.7. Require vehicle placement in order to earn multiple credits

Under the staff proposal, vehicles that are "delivered for sale" but not actually placed in service would not be eligible for multiple credits.

This change is proposed in order to encourage that vehicles are actually placed in service rather than stored. The latter approach provides no air quality benefit and does nothing to build a market or hasten vehicle commercialization.

3.3 Miscellaneous Changes

3.3.1 Provide certainty regarding the sales volume number used to determine the ZEV obligation

Under the current regulation, the ZEV obligation for a manufacturer in a given model year is based upon the number of passenger cars and light duty trucks sold by the manufacturer in that same model year. As a result the exact obligation is not known in advance, which complicates compliance planning.

In order to provide greater certainty, staff proposes that the Board make the sales volume used to determine manufacturers' ZEV obligation in a given year a function of vehicle sales in a prior year, and that the Board freeze the volume number for three years at a time. This change is limited only to the determination of the sales volume against which the ZEV percentage requirements are assessed in a given year. It does not affect the determination of manufacturer status (large vs. intermediate vs. small), which is handled separately.

Specifically, under the staff proposal the sales volume used to determine manufacturers' ZEV obligation would be fixed for three year periods, beginning with 2003-2005, followed by 2006-2008, 2009-2011, and so on. The sales volume figure in each three year period would be the three year average sales from two periods prior. For example, the sales volume used for 2003-2005 would be the average for sales in 1997-1999, and the sales volume used for 2006-2008 would be the average for sales in 2000-2002.

3.3.2 Increase the volume threshold for intermediate and large manufacturers

Under the current regulation, intermediate manufactures are defined as those with California sales between 4,501 and 35,000 light and medium duty vehicles

per year. Intermediate manufacturers can meet their entire ZEV obligation using PZEVs. Manufacturers with sales greater than 35,000 are classified as large, and are subject to the 4 percent ZEV minimum production requirement. Staff proposes that the Board increase the threshold at which a manufacturer is designated as "large" to 60,000.

Under the current regulation, two manufacturers (BMW and Volkswagen) would transition from intermediate to large in 2006. The staff proposal would delay that transition until their sales reach the higher threshold. This change is proposed to narrow the gap between the manufacturers at the low end of the large range and the other large manufacturers, the smallest of whom has sales in excess of 90,000. In addition it will limit the number of manufacturers that must compete to place ZEVs in the same market in the early years.

3.3.3. Phase in ZEV compliance for intermediate manufacturers that transition to large

Under the current regulation, an intermediate manufacturer that transitions to large is likely to "overcomply" with the regulation as compared to other large volume manufacturers. This situation arises because prior to the transition, the manufacturer, as an intermediate, can meet the 10 percent requirement entirely with PZEVs. Thus an intermediate manufacturer could already have 50 percent of its fleet meeting the PZEV requirement (assuming compliance using gasoline SULEV PZEVs that generate an allowance of 0.2). After the transition, the manufacturer would still have 50 percent PZEVs, but would also need 4 percent ZEVs. This is the equivalent of a 14 percent rather than 10 percent ZEV requirement.

Under the staff proposal, manufacturers that transition to large would not be subject to the ZEV requirement until the sixth model year after three consecutive model years with sales greater than the large manufacturer threshold.

These changes are proposed to mitigate the inequity of certain manufacturers facing higher effective requirements than other manufacturers in the same size classification.

3.3.4 Exempt independent low volume manufacturers with California sales of less than 10,000 from the ZEV percentage requirements

Under the current regulation, small volume manufacturers, defined as those with California sales below 4,500 per year, are not subject to the ZEV requirement. Under the staff proposal, in addition to the small volume exemption, an independently owned manufacturer with California sales of less than 10,000 per year would be defined as an "independent low volume manufacturer", and would not be required to meet the percentage ZEV requirements. In determining total California production, the "independent low volume manufacturer" provisions

would aggregate production of firms commonly owned in 10 percent or greater part. The criteria are based on those developed by the USEPA.

Similar to the previous change regarding intermediate manufacturers, this change is proposed in order to narrow the gap between the various manufacturers classified as intermediate. Porsche could transition to intermediate under the current regulation, but would likely be an independent low volume manufacturer under the staff proposal.

3.4 Effect of Proposed Changes

The following sections provide estimates of the number of vehicles required, and the number of credits earned per vehicle, under the draft staff proposal as opposed to the current regulation.

3.4.1 Number of Vehicles

Table 3-7 below shows for model years 2003 through 2008 the number of ZEVs, PZEVs, and advanced technology PZEVs that would be produced under the current regulation and the draft staff proposal. These totals are calculated using the same assumptions that were used for the "base case" estimate in the August staff report (1998 production total and market share, MOA full function vehicles, no early introduction, 4 percent ZEVs from all manufacturers). Thus the "100 percent full function EV" total of 9,300 under the draft staff proposal is comparable to the 22,000 total from the staff report. Note that these totals assume that all manufacturers take full advantage of the 6 percent PZEV option.

Two cases are shown for the draft staff proposal. The first assumes that all manufacturers meet the full 4 percent requirement with ZEVs--that is, they do not take advantage of the option to meet half of the requirement with advanced technology PZEVs. The second case assumes that all manufacturers take full advantage of the 2 percent advanced technology PZEV option. In this case, the number of ZEVs is cut in half, to be replaced by advanced technology PZEVs.

The number of advanced technology PZEVs increases each year due to the phase out of the PZEV early introduction multiplier.

Combinations of vehicle types (e.g. one third each of NEVs, City EVs, and full function EVs) would result in totals that fall within the high and low ranges shown in Table 3-7.

Table 3-7
Vehicle Production, Current Regulation and Staff Proposal

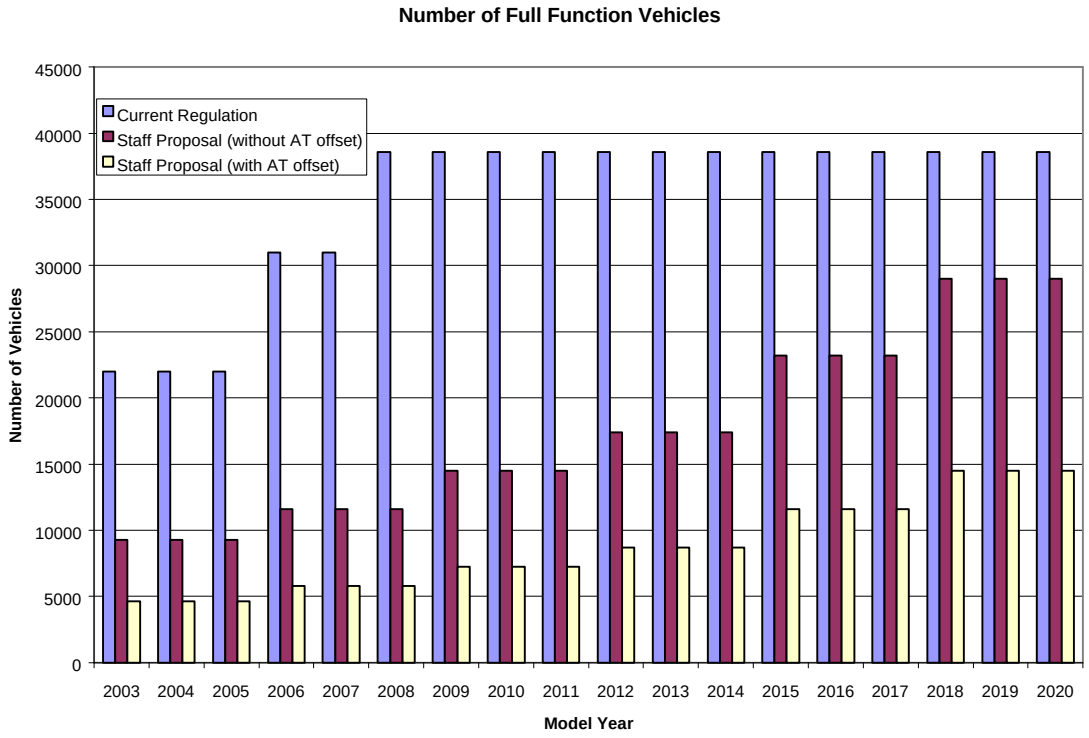
		2003	2004	2005	2006	2007	2008
Current Regulation							
ZEVs							
	If 100 percent full function EV	22,000	22,000	22,000	31,000	31,000	38,600
	If 100 percent City EV	38,600	38,600	38,600	38,600	38,600	38,600
	If 100 percent NEV	38,600	38,600	38,600	38,600	38,600	38,600
AT PZEVs (a)		0	0	0	0	0	0
PZEVs (b)	Large manufacturers	290,000	290,000	290,000	290,000	290,000	290,000
	Intermediate manufacturers	90,000	90,000	90,000	90,000	90,000	90,000
	Total	380,000	380,000	380,000	380,000	380,000	380,000
Draft Staff Proposal (c)							
1. Assuming no Advanced Technology PZEVs (4 percent ZEVs)							
ZEVs							
	If 100 percent full function EV	9,300	9,300	9,300	11,600	11,600	11,600
	If 100 percent City EV	23,500	23,500	23,500	29,400	29,400	29,400
	If 100 percent NEV	30,900	61,800	61,800	257,000	257,000	257,000
AT PZEVs		0	0	0	0	0	0
PZEVs (b)	Large manufacturers	72,000	145,000	218,000	290,000	290,000	290,000
	Intermediate manufacturers	22,500	45,000	67,500	90,000	90,000	90,000
	Total	94,500	190,000	285,500	380,000	380,000	380,000
2. Assuming 2 percent Advanced Technology PZEVs (2 percent ZEVs)							
ZEVs							
	If 100 percent full function EV	4,650	4,650	4,650	5,800	5,800	5,800
	If 100 percent City EV	11,750	11,750	11,750	14,700	14,700	14,700
	If 100 percent NEV	15,450	30,900	30,900	128,700	128,700	128,700
AT PZEVs (d)		10,700	21,500	32,200	43,000	43,000	43,000
PZEVs (b)	Large manufacturers	72,000	145,000	218,000	290,000	290,000	290,000
	Intermediate manufacturers	22,500	45,000	67,500	90,000	90,000	90,000
	Total	94,500	190,000	285,500	380,000	380,000	380,000

(a) Under the current regulation there is no distinction between an advanced technology (AT) PZEV and a gasoline engine PZEV other than their relative allowance. Neither can be counted towards the 4 percent requirement.
(b) Assumes full 6 percent is met with gasoline SULEV PZEVs earning an allowance of 0.2.
(c) Does not include effect of efficiency credit or power train warranty credit.
(d) Assumes a vehicle with a 0.45 (before multiplier) allowance, such as a Toyota Prius PZEV.

Graph 3-3 below shows the number of full function vehicles that would be required, using the “base case” assumptions, in model years 2003 through 2020.

These calculations do not take into account any change that would result from the introduction of efficiency multipliers in 2007; rather, they are calculated using the 2003 credit structure throughout. They also do not take into account the effect of any power train warranty credits. These factors are discussed separately below.

Graph 3-3



3.4.2 Estimated Credits Earned per Vehicle

Table 3-8 below shows the number of credits that staff estimates would be earned in 2001, 2002 and 2003, for selected vehicle types, under the current regulation and under the draft staff proposal. These are provided as examples; because of the flexibility given to manufacturers we do not know if any of these vehicles will be delivered for sale to comply with the 2003 requirement.

Table 3-8
Estimated Credits Earned Per Vehicle, Current and Revised Regulation

Manufacturer	Model Year	Vehicle	Battery type	2001 Credit		2002 Credit		2003 Credit	
				Current	Revised	Current	Revised	Current	Revised
DaimlerChrysler	1999	EPIC	NiMH	1.00	10.72	1.00	10.72	1.00	3.35
Ford	2000	Ranger	PbA	1.00	9.12	1.00	9.12	1.00	2.85
GM	1999	EV1	PbA	4.30	13.78	4.30	13.78	2.30	4.31
Honda	1999	EV Plus	NiMH	4.67	16.03	4.67	16.03	2.67	5.01
Nissan	2000	Altra	Li+	4.77	16.64	4.77	16.64	2.77	5.20
Toyota	2000	RAV4 EV	NiMH	5.13	18.78	5.13	18.78	3.13	5.87
Ford		Th!nk City	NiCad	1.00	4.48	1.00	4.48	1.00	1.40
Honda		City Pal	NiMH	1.00	8.80	1.00	8.80	1.00	2.75
Nissan		Hypermini	Li+	1.00	5.60	1.00	5.60	1.00	1.75
Toyota		eCom	NiMH	1.00	5.60	1.00	5.60	1.00	1.75
		NEV		1.00	4.00	1.00	4.00	1.00	1.25

Note that the biggest gains go to full function vehicles that formerly were below the 100 mile range cutoff for multiple credits, but now exceed the 50 mile range cutoff (EPIC and Ranger). Also please note that because the City EVs have not been certified, our calculation of their credit score is based on publicly available information rather than test cycle results.

3.4.3 Relative Credit Values

Table 3-9 shows the 2003 credit values under the draft staff proposal for NEVs, selected City EVs, and full function EVs from the same manufacturer. It then shows the ratio of City EV credit to NEV credit, full function EV credit to City EV credit, and full function EV credit to NEV credit. Again, note that these estimates are based on publicly available information rather than test cycle results.

Table 3-9
Ratio of 2003 Credits, NEV vs. City EV vs. Full Function EV

Manufacturer	Vehicle Type			Ratio		
	NEV	City	FFEV	City/NEV	FFEV/City	FFEV/NEV
Ford	1.25	1.40	2.85	1.12	2.04	2.28
Honda	1.25	2.75	5.01	2.20	1.82	4.01
Nissan	1.25	1.75	5.20	1.40	2.97	4.16
Toyota	1.25	1.75	5.87	1.40	3.35	4.70

These ratios illustrate the relative value of different vehicles to the manufacturer. For example, using the above credit values, in the case of Toyota one City EV would be worth 1.4 NEVs, one full function EV would be worth 3.35 City EVs, and one full function EV would be worth 4.7 NEVs.

As was noted above, after an appropriate transition period the staff proposal would reduce the NEV credit to 0.15. This transition would be complete in 2006. Table 3-10 below shows the credit ratios that will be in place on a long term basis under the staff proposal. Our intent is that these values should, overall, encourage manufacturers to produce a variety of vehicle types, rather than all NEVs or all City EVs.

Table 3-10
Ratio of 2006 Credits, NEV vs. City EV vs. Full Function EV

	Vehicle Type			Ratio		
Manufacturer	NEV	City	FFEV	City/NEV	FFEV/City	FFEV/NEV
Ford	0.15	1.12	2.28	7.47	2.04	15.20
Honda	0.15	2.20	4.01	14.67	1.82	26.72
Nissan	0.15	1.40	4.16	9.33	2.97	27.73
Toyota	0.15	1.40	4.70	9.33	3.35	31.31

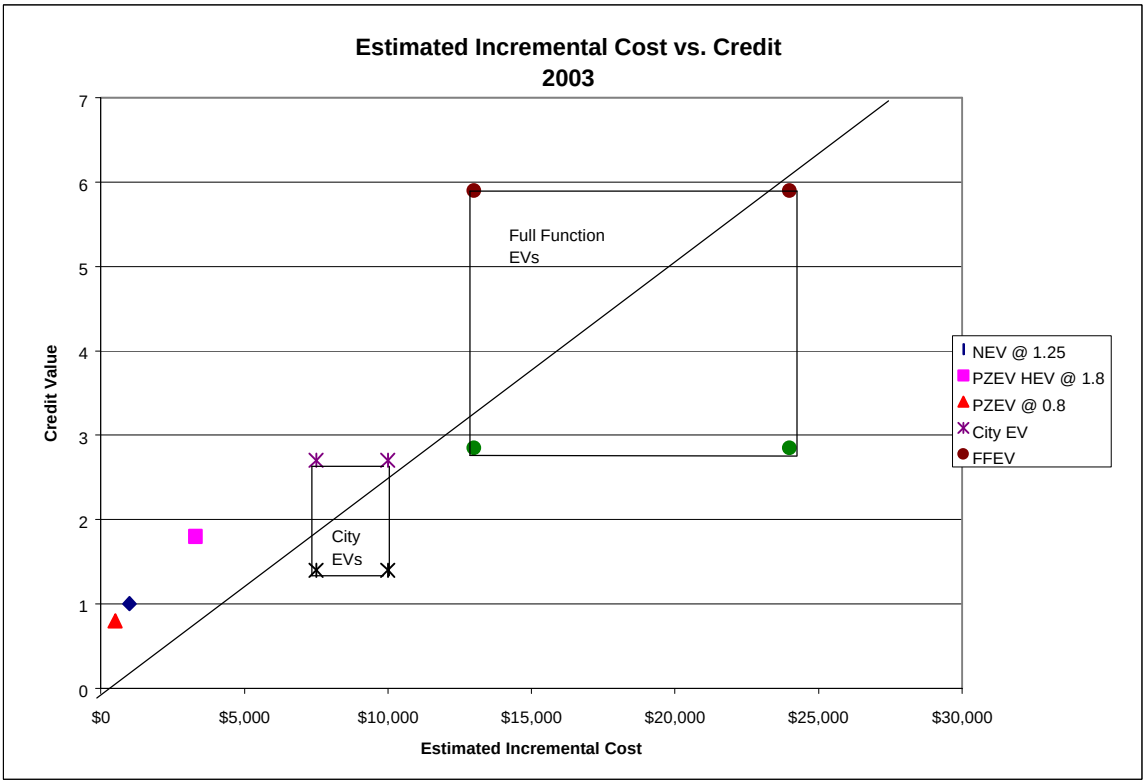
Note that by 2006 the credit value of City EVs and full function EVs as compared to NEVs would increase greatly. Again using the case of Toyota, one City EV would be worth 9.33 NEVs, one full function EV would be worth 3.35 City EVs (this ratio does not change), and one full function EV would be worth 31.31 NEVs.

Graphs 3-4 and 3-5 that follow show the relative value of various ZEV and PZEV credits from a different standpoint. These graphs display the credit value earned vs. the estimated incremental cost for various vehicle types. Graph 3-4 uses the credit values earned in 2003, which incorporate the various phase-in multipliers. Graph 3-5 uses the credit values earned in 2006, after the phase-in multipliers for ZEVs and PZEVs are no longer in effect and the NEV credit value has been reduced to 0.15.

The cost and credit values for City EVs and full function EVs in these graphs are shown as ranges, using the high and low values both for credits earned and for the estimated incremental cost for such vehicles. We did so because we do not have complete vehicle-specific ZEV cost information, and the information that we do have is subject to trade secret limitations.

Finally, these graphs do not take into account any changes in vehicle technology that would reduce the estimated incremental cost for any vehicle type between 2003 and 2006.

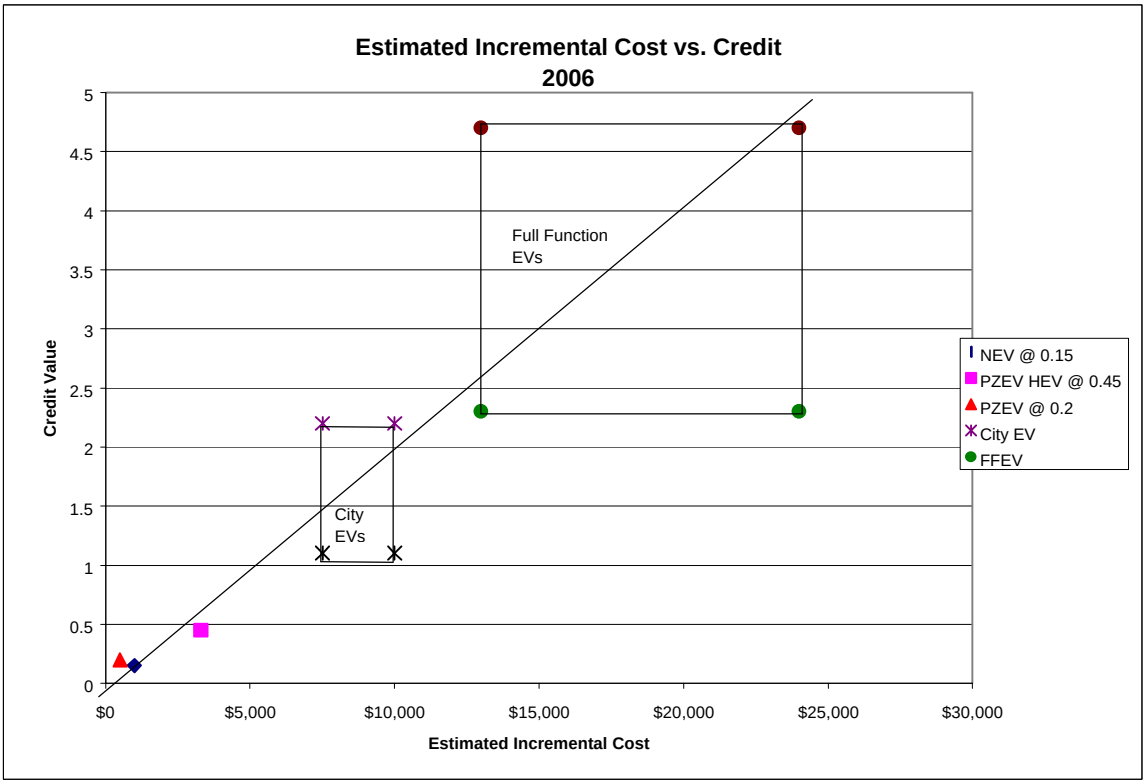
Graph 3-4



As is shown by Graph 3-4 above, in 2003 the PZEV, NEV, and PZEV HEV have relatively high credit ratios, due to the PZEV phase-in multiplier and the fact that the NEV discount has not yet taken effect. Thus these credit ratios are affected by temporary factors--the need to provide lead time for a reduction in NEV credit, and the near term constraints on PZEV production due to the planned retirement date for engine families, engineering challenges, and the large number of vehicles needed to take full advantage of the PZEV option.

Graph 3-5 provides the same information, using the long term credit values that would be in effect in 2006.

Graph 3-5



As is show by Graph 3-5 above, when the long term credit values are in effect, beginning in 2006, the relative credit values of the various vehicle types appear to be appropriate given the estimated incremental costs.

3.4.4 Effect of Efficiency Multiplier

The effect of the efficiency multiplier on the number of vehicles will depend on the performance of the vehicles produced in future years. Staff has chosen the parameters used in order to keep the required number of vehicles roughly the same. This of course could vary--if manufactures move to highly efficient vehicles then fewer vehicles overall would need to be produced. Such vehicles, however, would be more cost effective and would have a better chance of competing in the marketplace.

3.4.5 Effect of Power Train Warranty Credit

The effect of the power train warranty is also difficult to predict. Such warranty credits, if earned by manufacturers, would reduce the required number of vehicles from the numbers shown above. In the extreme, if all manufacturers took full advantage of the credit mechanism, and all vehicles remained on the road for at least 13 years, after 13 years the number of credits generated per year by vehicles on the road would be sufficient to fully meet a 4 percent requirement without any new vehicles (note, however, that by this time the

overall percentage requirement will have increased). On the other hand, such warranties, if successful, would increase the number of zero emission vehicles actually in service and the number of zero emission vehicle miles traveled.

4. REGULATORY ALTERNATIVES

4.1 Do Not Modify Program

The Board could leave the regulation intact. As described above, this would leave in place the requirement that manufacturers produce and offer for sale roughly 22,000 full function EVs in 2003 and subsequent years, along with some 380,000 PZEVs per year. Alternatively, they could produce and offer for sale some 39,000 City EVs or neighborhood electric vehicles each year rather than full function vehicles. Several additional manufacturers would transition from intermediate to large status in 2006, and would need to begin producing ZEVs at that time.

In staff's view, it would be very challenging to place the required number of ZEVs in service. With regard to PZEVs, manufacturers have testified that due to lead time, the timing of platform changeovers, and other factors, they will not be able to take full advantage of the PZEV option in the early years of the program. This would result in yet more ZEVs that would need to be placed.

Production at this level also would impose a large cost burden on the manufacturers. The vehicles would need to be priced aggressively in order to meet the sales targets, and this would reduce the revenue available to the manufacturers to offset their costs. Finally, to the extent that the state provides subsidies in order to assist with vehicle marketing, such a large number of vehicles needing subsidies would result in large state expenditures.

4.2 Delay Program Implementation

The Board could delay implementation of the ZEV requirement until such time as it believes that improved ZEV technology will be available. Under this approach, no ZEVs or PZEVs would be offered for sale until the program was in force.

This clearly would reduce the cost burden on manufacturers. It would also, however, eliminate any ability to see if there are successful market niches for battery electric vehicles. Similarly, it would remove all regulatory pressure to improve zero emission vehicle technology, and likely slow the pace of commercialization of a variety of advanced vehicle technologies. In addition, it would postpone the introduction of large numbers of PZEV vehicles, which with their 15 year emission warranty would make a significant improvement in California's air quality over time.

5. ECONOMIC IMPACTS

The proposed amendments to the Zero Emission Vehicle program will reduce the costs borne by automobile manufacturers and dealers. Staff believes, therefore, that the proposed amendments would cause no noticeable adverse impact in California employment, business status, and competitiveness. Because the ZEV regulations provide considerable flexibility to manufacturers, the magnitude of these savings is difficult to estimate with any certainty. A more detailed discussion follows.

5.1 Legal Requirement

Sections 11346.3 and 11346.54 of the Government Code require state agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include consideration of the impact of the proposed regulation on California jobs, business expansion, elimination, or creation, and the ability of California businesses to compete.

State agencies are also required to estimate the cost or savings to any state or local agency and school districts in accordance with instruction adopted by the Department of Finance. This estimate is to include any nondiscretionary costs or savings to local agencies and the costs or savings in federal funding to the state.

5.2 Directly Affected Businesses

Any business involved in manufacturing passenger cars and light-duty trucks would be directly affected by the proposed amendments. Also affected are businesses that supply parts for these vehicles. California accounts for only a small share of total nationwide motor vehicle and parts manufacturing. There are about 40 companies worldwide that manufacture California-certified light- and medium-duty vehicles and heavy-duty gasoline engines. Only one motor vehicle manufacturing plant is located in California, the NUMMI facility, which is a joint venture between GM and Toyota.

5.3 Potential Impact on Manufacturers

The proposed amendments are expected to significantly reduce costs to motor vehicle and parts manufacturers. The key factors that determine the cost of compliance with the current ZEV regulation, or an amended version, are (1) the number of vehicles that are required to be placed, and (2) the incremental cost per vehicle. Both must be estimated, and both estimates are subject to considerable uncertainty.

Section 3.4.1 above presents staff estimates as to the number of ZEVs and PZEVs that must be produced and offered for sale in order to satisfy the current

and amended regulation. Because of the flexibility provided in the regulation, it is not possible to present a single point estimate. For ZEVs, different totals are provided assuming that the manufacturers use 100 percent NEVs, 100 percent City EVs, or 100 percent full function EVs. All of the ZEV estimates assume that manufacturers take full advantage of the possible 6 percent PZEV offset. For PZEVs, the type of vehicle to be used in the early years is known (primarily 0.2 allowance PZEV SULEVs), but uncertainty still arises because we do not know how many PZEVs manufacturers will be able to produce.

With regard to incremental cost per vehicle, a detailed cost analysis addressing the incremental cost of various vehicle types was presented in the August 8, 2000 Biennial Review Staff Report. These estimates also are subject to error, and as noted in the Staff Report there is great difficulty and uncertainty associated with projecting future costs for evolving technology.

Finally, the actual impact on manufacturers depends upon the extent to which they are able to pass along any increased costs to dealerships or vehicle purchasers, and the amount of any public subsidies that are provided.

For all of these reasons, staff notes that although the direction of the cost impact of the proposed amendments is clear--they will reduce the cost of the program--the magnitude of the savings is much more difficult to assess. We present our best estimates, based upon what we believe are reasonable assumptions, but we emphasize that the reader take note of the uncertainty involved. We first address the cost of the current regulation. We then discuss the cost of the staff proposal, and then finally the savings due to the staff proposal (the difference between the two). At the end of this section there is a summary table that lays out the results of our cost estimation in comparison form.

5.3.1 Current Regulation

Turning first to the current regulation, Section 3.4.1 above estimated that for model year 2003 roughly 22,000 ZEVs would be produced assuming 100 percent full function vehicles, and 38,600 ZEVs would be produced if the manufacturers built 100 percent City EVs or NEVs. In addition, large manufacturers would produce about 290,000 PZEVs, and intermediate manufacturers would produce another 90,000 PZEVs.

In the August 7 Staff Report, the total near term incremental cost for full function ZEVs was estimated to range between $13,000 and $24,000, depending on the type of vehicle and the battery employed. For City EVs the near term incremental cost ranged from $7,500 to $10,000. No estimate was provided for NEVs. PZEV SULEVs were estimated at $500 incremental cost, and PZEV HEVs at $3,300. For the purposes of the cost discussion here we assume an incremental cost of $17,000 for full function EVs (between the low and high staff

report estimates), $8,000 for City EVs, $1,000 for NEVs, $500 for PZEV SULEVs, and $3,300 for PZEV HEVs.

Using the assumptions and estimates described above, the total cost of the current regulation for model year 2003 would be roughly $39 million to $374 million for the 4 percent ZEV component (100 percent NEVs at the low end and 100 percent full function EVs at the high end), and roughly $190 million for the 6 percent PZEV component. These estimates are summarized in Table 5-1. Note that it is not clear that all of this cost would necessarily be borne by manufacturers--it could also be shared with dealerships, vehicle purchasers and/or with the state.

Table 5-1
Estimated Incremental Cost of Current Regulation

Current Regulation		Number of Vehicles	Incremental Cost	Total Cost
ZEVs	If full function	22,000	$17,000	$374,000,000
	If City	38,600	$8,000	$308,800,000
	If NEV	38,600	$1,000	$38,600,000
PZEVs	SULEV	380,000	$500	$190,000,000
	AT	0	$3,300	$0
Total	If full function			$564,000,000
	If City			$498,800,000
	If NEV			$228,600,000

5.3.2 Staff Proposal

Two estimates are provided in Section 3.4.1 above for the number of vehicles required under the staff proposal. The first assumes full 4 percent ZEV production (no use of the 2 percent advanced technology PZEV option). Under this scenario, the number of ZEVs in 2003 is roughly 9,300 for full function EVs, 23,500 for City EVs, or 30,900 for NEVs. The number of PZEVs in 2003 is roughly 72,000 for large manufacturers plus 22,500 for intermediate manufacturers. These vehicle totals result in a 2003 cost for 4 percent ZEV production of $31 million assuming NEVs, $188 million assuming City EVs, and $158 million assuming full function EVs. The cost of PZEV production is roughly $47 million. These estimates are shown in Table 5-2.

Table 5-2
Estimated Incremental Cost of Staff Proposal, Without AT Option

Staff Proposal, without AT option		Number of Vehicles	Incremental Cost	Total Cost
ZEVs	If full function	9,300	$17,000	$158,100,000
	If City	23,500	$8,000	$188,000,000
	If NEV	30,900	$1,000	$30,900,000
PZEVs	SULEV	94,500	$500	$47,250,000
	AT	0	$3,300	$0
Total	If full function			$205,350,000
	If City			$235,250,000
	If NEV			$78,150,000

The second staff proposal estimate assumes that manufacturers take full advantage of the option to offset 2 percent of the ZEV requirement using advanced technology PZEVs. For purposes of this estimate we assume that the advanced technology PZEVs offered for sale in 2003 would be PZEV versions of power assist hybrid electric vehicles such as the Prius or Insight. Under this scenario the number of ZEVs is 4,650 assuming full function, 11,750 assuming City EVs, and 15,500 assuming NEVs. This scenario also assumes production of about 72,000 basic (0.2 allowance) PZEVs for large manufacturers plus 22,500 for intermediate manufacturers. Finally, it assumes production of 10,700 advanced technology PZEVs. These vehicle totals result in a 2003 cost for ZEV production of $15 million for NEVs, $94 million for City EVs, or $79 million for full function EVs. The cost for basic (0.2 allowance) PZEVs is about $47 million, and the cost for advanced technology PZEVs is about $35 million. These estimates are shown in the Table 5-3.

Table 5-3
Estimated Incremental Cost of Staff Proposal, With AT Option

Staff Proposal, with AT option		Number of Vehicles	Incremental Cost	Total Cost
ZEVs	If full function	4,650	$17,000	$79,050,000
	If City	11,750	$8,000	$94,000,000
	If NEV	15,450	$1,000	$15,450,000
PZEVs	SULEV	94,500	$500	$47,250,000
	AT	10,700	$3,300	$35,310,000
Total	If full function			$161,610,000
	If City			$176,560,000
	If NEV			$98,010,000

5.3.3 Cost Savings

Adding up the total cost of the program (ZEV, PZEV and advanced technology PZEV production), the estimated savings due to the staff proposal in model year 2003 range from about $130 million (for a manufacturer that meets its ZEV obligation with 100 percent NEVs under both the current and the amended regulation) to more than $400 million (for a manufacturer that meets its ZEV obligation with 100 percent full function EVs under both scenarios.) These estimates are shown in the Table 5-4.

Table 5-4
Estimated 2003 Savings Under Staff Proposal

Difference		Current vs. w/o AT Optiont	Current vs. with AT Option
ZEVs	If full function	-$215,900,000	-$294,950,000
	If City	-$120,800,000	-$214,800,000
	If NEV	-$7,700,000	-$23,150,000
PZEVs	SULEV	-$142,750,000	-$142,750,000
	AT	$0	$35,310,000
Total	If full function	-$358,650,000	-$402,390,000
	If City	-$263,550,000	-$322,240,000
	If NEV	-$150,450,000	-$130,590,000

Once again, it must be emphasized that the distribution of such savings among manufacturers, dealerships, vehicle purchasers and subsidy providers has not been estimated.

The savings due to the staff proposal would continue on in future years. The savings in 2004 would be less than in 2003, due to the increased volume of PZEV production required as the PZEV phase-in multiplier is reduced.

5.4 Potential Impact on Dealerships

The extent to which motor vehicle dealerships are affected by the current ZEV regulation, or the amended regulation, depends on the specifics of the interaction between the dealership and the manufacturer. During the course of the biennial review dealership representatives stated their concern that they would be forced to absorb increased costs stemming from the increased incremental cost of vehicles produced to meet the regulation. Staff is unable to estimate the magnitude of any such effect. It is clear, however, that by reducing total program costs the proposed amendments would also reduce any cost impact on motor vehicle dealerships.

5.5 Potential Impacts on Vehicle Operators

As is the case with dealerships, the impact of the current regulation or the amended regulation on vehicle purchasers will depend on the extent to which manufacturers choose, and are able, to pass along any increased costs. Once again, staff cannot estimate the extent to which this would occur, but it is clear that the proposed amendments would serve to reduce any possible cost increases for vehicle purchasers as compared to the current regulation.

5.6 Potential Impact on Business Competitiveness

Because the proposed amendments are anticipated to reduce costs faced by California businesses, they would have no adverse impact on the ability of California businesses to compete with businesses in other states as

5.7 Potential Impact on Employment

The proposed amendments are not expected to cause a noticeable change in California employment because California accounts for only a small share of motor vehicle and parts manufacturing employment.

5.8 Potential Impact on Business Creation, Elimination or Expansion

The proposed amendments are not expected to affect business creation, elimination or expansion.

5.9 Potential Costs to Local and State Agencies

The proposed amendments are not expected to result in an increase in costs for state and local agencies.

6. ENVIRONMENTAL IMPACTS

6.1 Introduction

This section outlines the emission impacts of the regulatory modifications proposed by staff. We describe staff's inventory model, the assumptions made concerning the passenger car and light-duty vehicle fleet, and the anticipated emission increases attributable to the proposed regulatory changes. The section concludes with a discussion of other environmental and energy impacts.

To assess the fleet-wide emissions impacts of both the current ZEV program and proposed regulatory changes, ARB staff conducted an emissions impact analysis using the updated on-road emissions inventory model, EMFAC2000, approved by the Board on May 25, 2000. The model was adjusted slightly to address the unique attributes of PZEV evaporative requirements, to include recent changes to the air conditioning corrective factors, and to reflect new evaporative data and analysis not included in the published version. Staff will be seeking Board approval for these minor revisions. The results of the analysis represent three implementation scenarios in the South Coast Air Basin, and include the emissions from passenger cars and light-duty trucks weighing less than 3,751 pounds gross vehicle weight.

As direct emissions from motor vehicles are reduced, the indirect emissions that result from vehicle refueling, fuel transportation, fuel processing, and feedstock extraction represent a larger share of the total emissions that are attributed to vehicle operation. Staff's estimates of indirect emissions are based on contract work conducted by Acurex Environmental (now part of A.D. Little) in 1996 and updated in 1999.

6.2 Emissions Scenarios

Staff has prepared estimates of the emission impact, in the South Coast Air Basin, of the staff proposal as compared to the current regulation. Estimates are provided for 2010 and for 2020. The vehicle totals used in these estimates are taken from Section 3.4 above, which shows the number of vehicles estimated to be produced under the current regulation and the proposed modifications. These vehicle totals are calculated using the same assumptions that were used for the estimates in the August 7, 2000 staff report (1998 production total and market share, MOA full function vehicles, 4 percent ZEVs from all manufacturers). Estimates were prepared for the current regulation, and for the staff proposal using the advanced technology option. This latter scenario was chosen because that is the compliance path that we expect will be pursued by manufacturers over the long run. Specifically:

- The Current Regulation scenario represents the ZEV credit calculation scheme used in the current ZEV regulations. In this scenario, manufacturers

take full advantage of the 6 percent PZEV option. Within the 4 percent requirement, the scenario uses the range achieved by the manufacturers' MOA vehicles. This results in overall ZEV percentages, for the large manufacturers, of 2.3 percent from 2003 through 2005, 3.2 percent in 2006 and 2007, and 4 percent in 2008 through 2010.

- The Staff Proposal with AT Option scenario assumes that all manufacturers take full advantage of the 2 percent advanced technology PZEV option. In this case, the number of ZEVs is reduced as compared to the current regulation, but part of the reduction in ZEVs is offset by advanced technology PZEVs.

The net emission impact of the staff proposal is made up of two components. First, there is the effect of the proposed changes to the "four percent" portion of the regulation (ZEVs and AT PZEVs). These changes result in a decrease in the number of ZEVs and an increase in the number of AT PZEVs, as compared to the current regulation. The second component of the emission impact is the effect of the proposed changes to the "six percent" portion of the regulation (0.2 allowance PZEVs). Here, because of the PZEV phase-in, the staff proposal would result in a decrease in the number of PZEVs produced over model years 2003 through 2005.

Table 6-1 below presents the difference in direct emissions for the South Coast Air Basin in 2010 for the staff proposal as compared to the current regulation. As is shown in the table, staff estimates that the proposed changes result in a 2010 net increase of about 0.14 tons per day of direct emissions, as compared to the current regulation. It is important to note, however, that this increase is almost entirely (more than 95 percent) due to the PZEV phase-in.

Table 6-1
Change in Direct Emissions
South Coast Air Basin in 2010
(Tons per day)*

	ROG Exhaust	ROG Evaporative	NOx Exhaust	Total ROG + NOx
Staff Proposal, with AT Option	-0.09	0.28	-0.05	0.14**

* Estimates include only those vehicles sold in model-years 2003 to 2010; other vehicles excluded

** This increase is almost entirely (more than 95 percent) due to the PZEV phase-in.

With regard to indirect emissions, staff estimates that the proposed changes would result in a minor net increase (less than 0.05 tons per day) in 2010 indirect emissions in the South Coast Air Basin. This net change would be due to a reduction in the number of pure ZEVs (which results in higher upstream

emissions), partially offset by an increase in the number of PZEV hybrid vehicles (which have greater fuel economy and hence lower upstream emissions).

To assess the longer-term impact of the proposed amendments, staff also prepared an emission inventory analysis for the year 2020. These estimates are for direct emissions only. Staff does not have information to support an upstream emission analysis for the year 2020 at this time.

Table 6-2 below presents the difference in 2020 direct emissions in the South Coast Air Basin for the staff proposal as compared to the current regulation. As is shown in the table, the staff proposal would result in a 2020 decrease of 0.08 tons per day as compared to the current regulation.

Table 6-2
Change in Direct Fleet Emissions
South Coast Air Basin in 2020
(Tons per day)*

Scenario	ROG Exhaust	ROG Evaporative	NOx Exhaust	Total ROG + NOx
Staff Proposal, with AT Option	-0.21	0.52	-0.39	-0.08

* Estimates include only those vehicles sold in model-years 2003 to 2020; other vehicles excluded

6.3 Other Environmental Media

As was noted in the August 7, 2000 Biennial Review Staff Report, ZEVs can make significant positive contributions in other environmental areas. Just as the gasoline refining, marketing and distribution system results in air pollution emissions, it likewise results in water pollution due to fuel leakage and wastewater discharges, and is a source of hazardous waste. Given the relatively small changes in near term fleet composition as a result of the proposed modifications, staff expects no significant impact in these environmental areas.

6.4 Energy Diversity and Energy Demand

Reducing demand for gasoline can have important benefits for California. First, a reduction in demand could help eliminate shortages of cleaner-burning California gasoline that have lead to rapid price increases. Second, a successful effort to reduce gasoline demand also would reduce the need for additional refining, transportation and distribution facilities, thus reducing air and water pollution as noted above. High-efficiency ZEVs and hybrid electric near-ZEVs also will result in significant reductions in emissions of CO_2 and other greenhouse gases.

EVs and hybrid electric vehicles typically take advantage of such measures and, as a result, achieve higher efficiencies. Battery EVs, which use electricity as a

fuel, provide significant alternative fuel benefits because electricity can be produced from a variety of non-petroleum energy resources. Moreover, because both electricity and hydrogen can be produced from renewable resources such as solar, wind or hydropower, or biomass feedstocks, these technologies can help pave the way towards a sustainable energy future.

The staff proposal incorporates an incentive for increased vehicle energy efficiency, to be phased in beginning in 2006. This will directly encourage increased vehicle efficiency, and provide corresponding energy benefits. In addition, staff expects that in the near term the PZEV option will be met using power assist hybrid vehicles. Because these vehicles are highly efficient, increased penetration of such vehicles into the marketplace will also bring bout energy benefits.

Staff is unable to provide a quantitative estimate of any such benefits at this time.

7. COST-EFFECTIVENESS

This section discusses the effect of staff's proposed amendments on the cost-effectiveness of the state's air quality program.

At the September 7 Board meeting, testimony was presented regarding the near term cost-effectiveness of the ZEV program. Estimates presented by vehicle manufacturers, based on cost and emission benefit information from the August 7 Biennial Review staff report, indicated that at least in the early years of the program the dollars spent per ton of pollutant reduced under the ZEV program will be much higher than for any other ARB regulatory measure. Despite this information, which was not disputed by staff, the Board voted unanimously to maintain the program. They did so because of a belief that the ZEV program needs to be viewed and considered on a long-term basis. As is highlighted in Resolution 00-29, adopted at the September 7 meeting, the Board found the ZEV program to be an essential component of the State's long-term air quality strategy, and further found that the ZEV program has brought about significant technological advances.

Given this background and context, near term cost-effectiveness is not a deciding factor in the Board's consideration of the ZEV program and staff's proposed changes. The Board directed staff to develop changes that address the cost challenges facing the program, but there is no specific target level or range of cost-effectiveness that must be achieved.

Section 6 above concludes that the changes in the staff proposal will result in an increase of roughly 0.14 tons per day in direct emissions of HC and NOx in the South Coast Air Basin in 2010, as compared to the current regulation. Indirect emissions are projected to increase by less than 0.05 tons per day. Due to State Implementation Plan requirements, the state will need to find other sources of emission reductions to offset any emissions increase. As was noted at the September 7 hearing, other near term measures to reduce emissions will have a lower cost per ton than the ZEV program. Therefore the total cost of achieving the necessary improvements in air quality will be less under the staff proposal than under the current regulation.

8. SUMMARY AND STAFF RECOMMENDATION

8.1 Summary of Staff Proposal

As presented in the previous sections, the staff proposal is designed to maintain progress towards commercialization of zero emission vehicles while recognizing near term constraints due to cost, lead time, and technical challenges. The proposal maintains a core ZEV component, but significantly reduces the total cost of the program.

The staff proposal would make the following specific modifications:

- Phase in PZEV introduction
- Phase in ZEV introduction
- Reduce future NEV credits
- Increase the ZEV percentage requirement over time
- Allow hybrid electric vehicles with an all electric range of 20 miles or more to be counted as ZEVs
- Allow other advanced technologies that are not ZEVs to satisfy part of the ZEV requirement
- Provide manufacturers that achieve double the PZEV phase-in level in 2003 and 2004 with extra time to take advantage of the advanced technology option
- Modify the ZEV range credit
- Provide in-service credits for ZEVs and zero-emission VMT vehicles that remain in service in California for more than three years, with a battery/fuel cell stack warranty in effect
- Increase the advanced ZEV componentry allowance
- Provide an allowance multiplier based on vehicle efficiency, phased in beginning in 2005
- Allow credits for vehicles placed in an approved demonstration program, even if not “delivered for sale”
- Require vehicle placement in order to earn multiple credits
- Provide certainty regarding the sales volume number used to determine the ZEV obligation
- Increase the volume threshold for large manufacturers
- Phase in ZEV compliance for intermediate manufacturers that transition to large
- Exempt independent low volume manufacturers from the ZEV percentage requirements

8.2 Staff Recommendation

The ARB staff recommends that the Board amend Section 1962, Title 13, California Code of Regulations, and the incorporated “California Exhaust

Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes". The regulation is set forth in the Proposed Regulation Order in Appendix A.

9. REFERENCES

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10 CFR 474, *Electric and Hybrid Vehicle Research, Development and Demonstration Program; Petroleum-Equivalent Fuel Economy Calculation*, U.S. Department of Energy

40 CFR 600, *Fuel Economy of Motor Vehicles*, U.S. Environmental Protection Agency

APPENDIX A: PROPOSED AMENDMENTS

1. Proposed Regulation Order: Amendments to the Zero-Emission Vehicle Regulation

   Attached

2. Proposed Amendments to California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes

   Copies of the Test Procedures are available on the ARB's Internet site for this rulemaking at http://www.arb.ca.gov/regact/zev2001/zev2001.htm, or may also be obtained by contacting the agency contact person for this rulemaking, Chuck Shulock, Vehicle Programs Specialist, at (916) 322-6964 or cshulock@arb.ca.gov.

APPENDIX B: RESOLUTION 00-29

State of California

AIR RESOURCES BOARD

Resolution 00-29

September 7, 2000

Agenda Item No.: 00-8-3

WHEREAS, the California State Implementation Plan (SIP) for ozone, adopted by the Air Resources Board (the ARB or Board) in November 1994, establishes the state strategy for attaining the ambient air quality standard for ozone in all areas of the state by 2010 as required by federal law; this plan includes, as part of the mobile source element developed by the ARB, the California Low-Emission Vehicle (LEV) program, which was approved by the Board in 1990 to provide significant reductions of ozone precursor pollutant emissions from passenger cars and light-duty trucks;

WHEREAS, the California LEV program includes a zero-emission vehicle (ZEV) element under which at least 10 percent of the passenger cars and lightest light-duty trucks produced by a large or intermediate-volume manufacturer and delivered for sale in California must be ZEVs, beginning in model year 2003;

WHEREAS, large-volume manufacturers are permitted to satisfy up to 6 percent of the 10 percent ZEV requirement with larger numbers of vehicles reflecting near-zero emitting technologies, and intermediate volume manufacturers may meet the entire 10 percent obligation via that route; the ZEV regulation also includes a number of credit generation and trading components that provide significant flexibility in meeting the requirements;

WHEREAS, with respect to the environment, ZEVs are the "gold standard" for vehicular air pollution control as they reduce both criteria and toxic pollutant emissions to the maximum feasible levels; high-efficiency ZEVs and hybrid electric near-ZEVs also cut emissions of carbon dioxide and other greenhouse gases;

WHEREAS, in Resolution 90-58 approving adoption of the regulations creating the California LEV program, the Board directed the staff to consult with the regulated industry and other interested parties and to prepare a report regarding the status of the implementation of the LEV program - including the ZEV requirement – for submission to Board at least every two years;

WHEREAS, in March and May of 2000, ARB staff held public workshops to solicit information regarding the status and issues related to the ZEV program such as vehicle and battery technology, infrastructure, marketability, cost, and environmental benefits;

WHEREAS, the ARB staff has evaluated the vehicle technologies and concluded that there is no technological barrier to building battery powered ZEVs but issues of cost and consumer acceptance remain; with regard to near-zero emission vehicles, technology exists which allows vehicles to achieve the required level of performance;

WHEREAS, to obtain the best available information on battery advances, costs and future trends, the ARB contracted with a Battery Panel composed of three outside experts; the Panel concluded that nickel metal hydride (NiMH) batteries are the most promising advanced technology - having both high performance and the longest useful life - but also that nickel metal-hydride battery costs are high and that mass production and further technological development is needed to reduce those costs;

WHEREAS, unlike conventional vehicles, battery powered ZEVs do not require an extensive "fueling" infrastructure since most customers will recharge at home or work, but the availability of public charging stations is nonetheless extremely important because of its influence on consumer confidence and acceptance; the public infrastructure for electric vehicles continues to expand in California, and there currently are about 400 public charging stations statewide with approximately 700 separate chargers;

WHEREAS, one issue affecting public charging infrastructure is the absence of uniform charging standards or equipment; a little more than half of all chargers are inductive, with the rest conductive;

WHEREAS, there is significant disagreement over the extent of market demand for electric vehicles; manufacturers assert that the lack of leases during the first years when vehicles were available means that the market can only absorb a few hundred ZEVs per year, while electric vehicle advocates point to current waiting lists as evidence of strong customer interest and pent-up demand; the entire market is new and product availability has been constrained to a degree that true consumer interest is exceedingly difficult to gauge;

WHEREAS, studies and surveys indicate that the primary factors affecting EV market demand are range, recharge time and competitive pricing; other important factors include public infrastructure, additional vehicle platforms, public education, and making electric vehicles available to retail customers;

WHEREAS, staff's cost analysis concludes that both the initial and lifecycle costs of battery electric vehicles will significantly exceed those of comparable conventional vehicles in the 2003 timeframe; however, with volume production and improved technology, battery electric vehicles could ultimately become competitive on a lifecycle cost basis;

WHEREAS, the fleet-wide emissions benefits of ZEV introduction will be modest in the near term due to the relatively small penetration of ZEVs and concurrent improvements in conventional vehicles; however, on a per vehicle basis, ZEVs are significantly cleaner than even the cleanest gasoline-powered alternative and will steadily reduce emissions as their fleet penetration grows, and more importantly, ZEVs have no risk of in-use emission control system failures; and

WHEREAS, ZEVs can make significant positive contributions in other environmental areas including water and hazardous waste reduction;

WHEREAS, vehicles powered by grid electricity increase the fuel diversity of California's transportation energy system; this reduces the State's dependence on foreign oil and contributes to greater stability in the overall transportation fuels market.

NOW, THEREFORE, BE IT RESOLVED that the Board finds the ZEV program to be an essential component of the State's long-term air quality strategy.

BE IT FURTHER RESOLVED that the basic ZEV requirements be retained and implemented in California.

BE IT FURTHER RESOLVED that the Board finds that the ZEV program has brought about significant technological advances through automakers' efforts to develop electric vehicles and interest in developing alternatives to electric vehicles.

BE IT FURTHER RESOLVED that the Board finds that the ZEV program is responsible for a renewed national and international focus on electric vehicles and related clean vehicle technologies.

BE IT FURTHER RESOLVED that the Board directs the staff to develop and propose regulatory modifications and other steps that address the challenges associated with the successful long- term implementation of the ZEV program - in particular the need for product availability and market stability, the need to greatly enhance public awareness and education of the attributes and benefits of ZEV technologies, and the need to reduce or mitigate the high initial costs of vehicles and batteries in low-volume production - and that result in a sustainable market for ZEVs.

BE IT FURTHER RESOLVED that such proposed regulatory modifications shall be brought to the Board as quickly as possible.

I hereby certify that the above is a true and correct copy of Resolution 00-29, as adopted by the Air Resources Board.

_____

Marie Kavan, Clerk of the Board

APPENDIX C: NON-REGULATORY MEASURES

In Resolution 00-29, the Board directed staff to develop and propose regulatory measures and other steps to address the challenges associated with the successful long- term implementation of the ZEV program. The January 25, 2001 Board hearing and this Initial Statement of Reasons are focused on regulatory amendments. Staff is also, however, pursuing non-regulatory matters such as incentives, infrastructure, and public outreach. This section outlines the current status of staff work in these areas. An updated version of this Appendix will be released prior to the Board hearing.

C.1 Incentives

In response to the Board's direction, staff has assessed the ZEV incentives currently available, what additional incentives may be needed, and how government (state, regional, and local) can ensure that such incentives are available up to the 2003 time frame, and--if needed--beyond. An overview of the staff assessment is provided here. More detailed information will be made available at the ZEV information web site (http:/www/ZEVinfo.com).

C.1.1 Need for Incentives

Incentives are commonly used by government to promote the introduction of new technology that will benefit society. Many of the current ZEV incentives are components of programs that promote the use of alternative fuels for reductions in air pollution and increased energy diversity. Incentives are an important tool for addressing the challenges to developing a sustainable market for ZEVs and the successful long-term implementation of the ZEV program. Incentives can be used to reduce or mitigate the high initial costs of vehicles and batteries in low volume production and can positively influence product availability and market stability in the near term. Additionally, through coordinated promotional efforts, state and local incentive program administrators can greatly enhance public education and awareness of the attributes and benefits of ZEV technologies.

The staff cost analysis presented at the September 2000 ZEV program biennial review concludes that both the initial and lifecycle costs of battery electric vehicles will significantly exceed those of comparable conventional vehicles now and in the 2003 timeframe. With volume production and improved technology, battery electric vehicles could ultimately become competitive on a lifecycle basis. However, while costs are high, it is vital to provide monetary and non-monetary support in the form of incentives to enhance ZEV marketability in the near term.

C.1.2 Incentives Currently Available

There are a number of federal, state, local and private incentive programs currently available. The incentives include tax credits, grants, and funding for programs. Some of the incentives may be available only for public agency fleets.

C.1.2.1 Federal Incentives

The National Energy Policy Act. The National Energy Policy Act of 1992 (EPAct) allows a federal tax credit of 10 percent of the cost of electric vehicles. The credit is based on the purchase price of a vehicle and may not exceed $4,000. The credit is available to vehicles placed into service after June 30, 1993 but before January 1, 2005. The federal tax credit is reduced by 1/4 in 2002 (to a maximum of $3,000); 1/2 in 2003 (to a maximum of $2,000); and 3/4 in 2004 (to a maximum of $1,000). This federal tax program expires after 2004. EPAct also allows a tax deduction of the actual cost, up to $100,000, of a clean fuel refueling site, which includes electric charging infrastructure.

EPAct also includes a 10-year electric vehicle demonstration program and a 15-year cooperative program between government and industry to research, develop and demonstrate electric vehicle charging infrastructure. In addition, the federal luxury tax has been eliminated for alternative fuel vehicles, including electric vehicles.

The Transportation Equity Act. The Transportation Equity Act for the 21st Century (TEA-21), passed into law in 1998, includes funding through its Congestion Mitigation and Air Quality (CMAQ) provisions for programs that reduce transportation related emissions in areas that are designated nonattainment, or maintenance, for federal air quality standards. Through this program, there are substantial opportunities to apply competitively for funds for an array of projects, including projects involving the purchase of ZEVs. The selection of projects fall under a cooperative process involving the state Department of Transportation (CalTrans), regional transportation coordinating committees and local air quality management and air pollution control districts.

Clean Cities. The Clean Cities Program of the U.S. Department of Energy (DOE) unites public and private sector entities whose common goal is to build the alternative fuels market. Under the coordination of DOE, locally based government/industry partnerships establish plans to achieve local goals for sustainable alternative fuels markets. DOE assists local partnerships with program development and funding for alternative fuel vehicle related projects and programs.

C.1.2.2 State and Local Incentives and Demonstration Programs

Buy-Down Incentives. California currently provides a $5,000 “buy-down” incentive available in many areas of the state to offset the higher incremental cost of a qualifying battery electric vehicle. The buy-down incentives have reduced the up front cost of leasing a ZEV by $5,000, making ZEVs much more attractive to customers. In most cases, these grants are funded 50/50 by the California Energy Commission (CEC) and local air districts that have agreed to participate and provide matching funds. Currently participating air districts include the Bay Area Air Quality Management District (BAAQMD), the Sacramento Metropolitan Air Quality Management District (SMAQMD), the Santa Barbara County Air Pollution Control District (SBCAPCD), the San Diego County Air Pollution Control District (SDCAPCD), the Ventura County Air Pollution Control District (VCAPCD), and the San Luis Obispo County Air Pollution Control District (SLOCAPCD).

In the South Coast Air Quality Management District (SCAQMD), a $5,000 buy-down incentive program is administered by the Mobile Source Pollution Reduction Committee (MSRC) without CEC funds. The MSRC also has a 25 percent match program for local governments. The BAAQMD administers a separate program using AB 433 funds that provides a $6,000 incentive to public agencies for a full-sized EV and a range of incentives for a variety of other electric vehicles.

ev Sacramento. The ARB funded a $2.5 million ev Sacramento program that provided incentives to public agencies in the Sacramento area to lease battery electric vehicles. The vehicles were offered to public agencies for three-year lease with the first year nearly free and the remaining two years at a cost comparable to equivalent gasoline vehicles. Funding was also provided by ARB to offset the cost of charger installation. ev Sacramento is jointly administered by ARB and the Department of General Services' Office of Fleet Administration.

Infrastructure Incentives. The CEC offers EV infrastructure incentives to fleet operators and consumers through participating automakers. Participating automakers are Ford, General Motors, DaimlerChrysler, Honda, Nissan and Toyota. Under the program, the CEC provides up to $500 to the automakers for each EV they lease or sell outside the SCAQMD. For vehicles leased or purchased in the SCAQMD, $750 is offered due to MSRC contributions. This incentive must be matched dollar-for-dollar by the automaker and can be used for charging equipment or installation hardware and/or labor. The BAQQMD and the MSRC also have programs to fund public infrastructure.

ZEV Incentive Program. AB 2061 (Lowenthal) established a new $18 million program to provide grants to reduce the incremental cost of leasing or buying a ZEV. The grants are available to eligible new zero emission passenger vehicles and light-duty trucks leased or purchased between October 1, 2000 and

December 31, 2002. The grant amount is up to $3,000 per year for three years (maximum $9,000) for eligible vehicles. If the entire $9,000 is provided for each vehicle, this would result in 2,000 grants. The incentive will be available throughout the State and allows, but does not require, air districts to augment the grants. The program will be administered by ARB, in conjunction with the CEC. Local air districts may voluntarily administer the program in their area. Staff guidelines for the program are scheduled for consideration by the Board on December 7, 2000. Staff intends to issue grants beginning in January 2001.

CEC Vehicle Purchase Incentive Program. The CEC has a newly established $5 million pilot efficiency-based vehicle purchase incentive program. The program's primary purpose will be to decrease California's growth rate in gasoline consumption and ease demand shortages due to supply constraints, while decreasing the environmental impact of new vehicles to California. Goals are to increase new fleet fuel economy and displace gasoline use with alternative fuel vehicles, transforming current market trends by promoting to the consumer vehicles with increased energy efficiency and lesser environmental impacts. Eligible vehicles could include high fuel economy gasoline vehicles in a class, hybrid electric (including gasoline or CNG) vehicles, CNG and other alternative fueled (ethanol, methanol, and propane) vehicles, battery electric vehicles and fuel cell vehicles.

Exemption from State Vehicle Fees. Adopted in 1998, SB 1782 (Thompson) exempts from the state vehicle license fee the incremental cost associated with the purchase or lease of an alternative fuel or electric vehicle meeting ARB's ultra low emissions vehicle standards. As a consequence, the fee to register an AFV or an electric vehicle is the same as for a comparable conventionally fueled vehicle even though the AFV or electric vehicle may have cost more.

Access to High Occupancy Vehicle (HOV) Lanes. As of June 1, 2000, AB 71 allows drivers of electric vehicles and ultra low emission vehicles that meet the federal "Inherently Low Emission Vehicle" standard (e.g. CNG) and have the required DMV-issued stickers to use high occupancy vehicle or carpool lanes even if the vehicle does not contain the required number of occupants.

Parking and Charging Support Incentives. Efforts to expand the public infrastructure have been focused on local government offices, businesses, shopping centers and regional destinations. The charging is free and parking may also be available at no charge. For example, the City of Sacramento public parking garages and Los Angeles International Airport provide free parking and charging for electric vehicles.

C.1.2.3 Utility Incentives

Several utilities currently provide time-of-use rates for electricity used to recharge electric vehicles. These utilities are the Los Angeles Department of Water and

Power, San Diego Gas and Electric, Sacramento Municipal Utility District (SMUD) and Pacific Gas and Electric.

C.1.3 Possible New Incentives

Staff would like to explore with other state agencies such as the CEC and DGS the possibility of creating additional statewide AFV incentive programs. Any new program should have well-defined goals including encouraging the availability and placement of electric vehicles. Programs to consider include dealer incentives for vehicle placement, funding for workplace charging, and expansion of the type of vehicles eligible. Current programs should be continued up to 2003, and beyond, and possibly expanded to provide incentives for City EVs, neighborhood EVs, and zero emission motorcycles. Staff would like to see the CEC pilot efficiency-based vehicle incentive program implemented and ultimately funded for the full program. Staff also is working on a model City/County ordinance that will assist local jurisdictions in their efforts to support ZEVs.

C.1.4 Next Steps

ARB staff has developed guidelines for implementing the $18 million ZEV Incentive Program authorized by AB 2061 (Lowenthal). These guidelines will be considered at the Board's December 7, 2000, Public Meeting. The guidelines were developed with the input of a stakeholder working group consisting of state agencies, local air quality management and air pollution control districts, automakers, auto dealers, fleet administrators, bill sponsors, and ZEV proponents. This working group has strongly encouraged the ARB, CEC and local air districts to work towards a statewide coordinated vehicle incentive program that will result in a vehicle incentive larger than any single individual incentive currently available from existing state and local vehicle buy down programs or through the AB 2061 program alone. It is envisioned that the coordinated vehicle incentive may be obtained through a single, seamless application process. ARB staff anticipates that the working group will remain active during the ZEV Incentive Program implementation.

An expanded ZEV incentive working group is also being considered that would seek out additional opportunities for new federal, state, and local incentives. The participants could potentially include state- and nationally based environmental groups and the California Air Pollution Control Officers Association. The participants, as a group and individually, would sponsor and support new incentive programs. ARB staff will offer to provide coordination for the work group's efforts.

C.2 Infrastructure Issues

The August 7, 2000 staff report discussed the considerable progress that has been made over the last several years in the development of charging

infrastructure to support battery electric vehicles. This includes the development and expansion of public charging, as well as the installation of charging stations at fleet facilities and residences.

The Board identified several issues for further action by ARB. These included maintenance and expansion of public charging, evaluating whether standardization of charging systems is needed, and evaluating what can be done to reduce infrastructure costs.

C.2.1 Public Charging

Public infrastructure enhances the utility of battery electric vehicles. Currently there are about 400 public charging stations statewide; the vast majority of these stations are located in metropolitan areas in southern California, the Bay Area, and Sacramento. Significant investments in public infrastructure have been made by a wide variety of local government agencies (cities, counties), local retailers, and infrastructure providers (including electric utility providers).

Based on direction provided by the Board at the September 7, 2000 Board meeting, and public comment, staff proposes that the following action items be considered to both expand and maintain public charging in California:

C.2.1.1 Centralized Information

The reliability of public chargers is very important. Many drivers routinely depend on public charging to extend the range of their vehicles. Clean Car Maps (www.cleancarmaps.com), along with several other sources, is an excellent source of information on the Internet. This site provides charger maps, charger types, and driving directions to chargers. It also allows the user to report problems with chargers. This type of centralized information is critical to assist drivers in locating and effectively using public chargers in their area.

C.2.1.2 Maintenance

Although charger failure and vandalism rates have been much lower than expected, it is extremely important that any needed charger repairs be done as expeditiously as possible so as not to erode public confidence in the technology. Repairs to public chargers can be delayed if information on how to contact the property owner is not readily accessible so that permission for repairs can be obtained in a timely manner. Also, it is very important to quickly repair any damage due to vandalism.

C.2.1.3 Paying for Public Charger Maintenance

Funding for charger repair and maintenance is critical. Most charger repairs are currently covered by the manufacturer under the charger warranty. It is very

important, however, to ensure that there is sufficient funding for repair of chargers damaged by vandalism, or for which the warranty has expired.

The Clean Car Maps website currently provides information and greatly assists with the repairs of chargers. ARB staff recommends that Clean Car Map be fully supported and, if necessary, expanded by stakeholders. To this end, staff proposes that ARB work with stakeholders to develop additional funding sources to support the Clean Car Maps. This would include funding for timely updates to charger location information, as well as the reporting, dispatching, and funding, if needed, for repair of public chargers. Stakeholders should work with ARB and Clean Car Maps to determine whether some type of "insurance" fund is need to support repair of chargers no longer warranted or damaged by vandalism.

C.2.1.4 Public Charging Expansion

ARB staff will continue to participate in efforts to expand public charging infrastructure. In particular, ARB staff recommends working with stakeholders to identify additional public and private funding sources to support public charging infrastructure. In addition, the development of outreach and educational materials targeted at encouraging public charging would be extremely helpful. A review and revision, if necessary, of criteria for selecting public charging locations that would target public infrastructure at the most critical areas should be completed. This would not only take into account recent increases in electric vehicle usage, but also identify those areas where a lack of infrastructure has been a disincentive to marketing vehicles. Such a study should also identify likely business partners that could make public infrastructure part of their customer service, as Costco has done.

C.2.2 Workplace Charging

Workplace charging requires more attention. While some employers have been slow to embrace employee charging, others have taken laudable initiatives. The cost of infrastructure installation has often been a disincentive. Staff recommends working with stakeholders to develop programs that encourage the installation of workplace charging.

C.2.3 Standardization

ARB received several comments at workshops and the September Board hearing on the need to establish requirements for a single charging standard. Staff believes that ARB has the regulatory authority to establish standards for electric vehicle charging systems. Staff does not, however, believe that lack of a standardized charging system will adversely impact vehicle deployment between 2000 and 2002. Nevertheless, the need for regulatory action in this area should to be thoroughly explored in 2001. If regulatory action is warranted, standards

should be promulgated in sufficient time to be incorporated into the 2006 model year.

C.2.4 Action Plan

Staff proposes the development of a California Infrastructure Stakeholder Group to address infrastructure issues on a statewide level. The Group would be charged with working in four areas:

- Public Charging. Develop a comprehensive list of public charging sites, review and make recommendations for any needed revisions to existing protocols for the siting of public chargers, identify funding sources for expansion of public charging, recommend strategies to encourage investment in public charging, and work to enhance a centralized information source for public charging.

- Workplace & Home Charging. Develop recommendations on strategies to encourage the installation of workplace chargers, as well as to reduce costs for fleet and residential charger installation. Review existing incentive programs for infrastructure, and make recommendations for any new programs that may be needed.

- Charger Performance. Exchange technical information related to "in the field" experience with chargers, charger problems, and maintenance requirements. Identify areas where additional research or field studies may be needed. Participate, if helpful, with industry standard activities, including UL, SAE, and other groups. Review information on new technical developments, including integrated charging and performance of new charger models and designs.

- Standardization. Work with ARB staff to develop recommendations on whether ARB should develop standards for a single charging system. Recommendations should thoroughly evaluate the need for such standards, mechanism for developing the standards, and impacts that standards would have on existing programs and vehicle development plans.

C.3 Public Education and Outreach

While upholding the ZEV mandate in its September 8 unanimous decision, the Board expressed the need to greatly enhance public awareness of the attributes and benefits of ZEV technologies. For this reason, staff proposes to develop a comprehensive public education and marketing plan for zero emission vehicles. This section begins with a description of ARB's current outreach activities, which is followed by a proposal for developing a comprehensive public outreach and education plan for ZEVs.

C.3.1 Current ARB Outreach Activities

To date, staff has been very proactive in conducting public outreach to schools, community events, and community groups. Using vehicles from the ARB test fleet, staff have participated in events at schools, youth groups, fairs, Earth Day celebrations, Science Day at the State Capitol, Clean Air Day, Clean Cities conferences, Electric Vehicle Symposiums and the Los Angeles International Auto Show, to name a few. These events provide participants with an opportunity to gain experience with the new vehicle technology and have questions answered about EV capabilities and environmental benefits.

The Short Term ev Loan program and EVs for Education have also been beneficial outreach tools. The Short Term ev Loan program allows public agencies to try an EV for one to two months to see if these vehicles meet the agency's needs. EVs for Education provides EVs to local air districts, schools and teachers for use in environmental and educational programs.

A new web site was created in August 2000 as a comprehensive and centralized place for ZEV information. www.ZEVinfo.com is a "one-stop" source for all ZEV related information. It currently provides information on vehicles, incentives and government programs for private individuals and fleets. In the future, an important goal of this web site is to provide seamless implementation of the different State run incentive programs that promote ZEVs and other clean and efficient vehicles in California.

This site was established to coincide with the kick-off of the first annual ZEVent on August 17, 2000. The ZEVent gave the ARB the opportunity to showcase the latest ZEV technologies and to acknowledge the participants of ev Sacramento, a program to assist State and local public agencies in the Sacramento region to lease EVs at competitive prices. Many marketing tools were developed for the ZEVent including lapel pins, tote bags, bumper stickers and window stickers.

C.3.2 Outreach and Education Plan

Although these efforts have been beneficial, a comprehensive outreach and education plan must be developed to take these efforts to the next level. The ARB recognizes that past efforts have been made by stakeholder groups including the California Electric Transportation Coalition, the ZEV Alliance, the Union of Concerned Scientists and CalPIRG to develop and implement ZEV awareness campaigns. All of these efforts have been beneficial to the ZEV program. Staff would like to work with these and other stakeholders to build on these past efforts. To do this, staff proposes to hold a workshop early next year to receive input from experts and stakeholders on developing the public education and outreach plan. Staff also proposes that a working group or steering committee be established to address this issue. Continued input from

such a group would be beneficial for the long-term success of implementing the plan.

As we move forward, the goals of a comprehensive outreach and public education plan should include educating consumers on how their transportation choices impact the environment, public health and energy consumption. Such a plan should also educate the public on the many attributes of new clean air technologies such as ZEVs.

To achieve these goals, it is important that the plan include ways to increase the publics' exposure to ZEV technologies, increase the publics' opportunities to test drive these vehicles, and ensure that up-to-date, accurate and easily accessible information on ZEVs is available. The plan should also address how different types of ZEVs fit into a zero emission transportation system.

If these elements along with input from experts and stakeholders are implemented, this comprehensive outreach and public education plan will play an important role in achieving a sustainable ZEV market in California.